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859
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no.2
f.d.
v.5

QUARTERLY REPORT #2

FIELD DATA

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SHOUT
SHARE
IT

BORING NO. P-1 Core Hole

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-1 CORE HOLE
DATE 9/21 TITLE SUN-PHILLIPS
ELEVATION ______ DATUM ______
START 9/21/74 COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED FAILING DRILL RIG
LOGGED BY MARK MILLIKEN

PAGE 1

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
0-5		1	AIR ROTORY		CHIPS	SILTY SANDSTONE, VERY FINE GRAINED, LIGHT BROWN, MASSIVE, NON CALCAREOUS	10 FT/HR
5-10		2	AIR ROTORY		"	SAME SANDSTONE AS ABOVE WITH AN ADDITIONAL VERY FINE GRAIN SANDSTONE, LIGHT GRAY, MASSIVE. SLIGHTLY CALCAREOUS	9 FT/HR
10-15		3	AIR ROTORY		"	SAME AS ABOVE, WITH A HIGHER % GRAY SANDSTONE THAN OF THE LIGHT BROWN SANDSTONE	10 FT/HR
15-20		4	AIR ROTORY		"	SAME AS ABOVE	11 FT/HR

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068

DATE 9/21 TITLE SUN PHILLIPS

START 9/21 COMPLETE

EQUIPMENT USED FAILING DRILL RIG

BORING NO. P-1 CORE HOLE

ELEVATION DATUM

WATER LEVEL AFTER

LOGGED BY MARK MILLIKEN

PAGE 2

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
20-25			AIR ROTORY		CHIPS	ENTIRE SAMPLE CONSISTS OF VERY FINE GRAIN silty LIGHT GRAY SANDSTONE	10/FT/HR
25-30			AIR ROTORY		"	SANDSTONE; SAME AS ABOVE	10 FT/HR
30-35			AIR ROTORY		"	SANDSTONE; SAME AS ABOVE	9/FT/HR
35-46			AIR ROTORY		"	SANDSTONE; SAME AS ABOVE	10 FT/HR

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-1 CORE HOLE
DATE 9/21 TITLE SUN-PHILLIPS
ELEVATION ______ DATUM ______
START 9/21 COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED FAILING DRILL RIG
LOGGED BY MARK MILLIKEN

PAGE 3

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
40-45			AIR ROTORY			SANDSTONE, AS ABOVE	10 FT/HR
45-50			AIR ROTORY			SANDSTONE, AS ABOVE	10 FT/HR
50-55			AIR ROTORY			SANDSTONE, AS ABOVE	10 FT/HR
55-60			AIR ROTORY			SANDSTONE, AS ABOVE	9 FT/HR
60-64			AIR ROTORY			SANDSTONE, AS ABOVE	10 FT/HR

NOTES: 64' FT - AIR ROTORY
64' PLUS - CORE RIG

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-1 Core
DATE 9/27/74 TITLE SUN- Phillps - SOHIO
ELEVATION ______ DATUM ______
START 14:50 COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED L-W Air Rotary
LOGGED BY M. Siembieda
Each space will represent 1 foot.
page 1 of __

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
60							
							3½ core
65							
						start of core 68' / V. porous	NON fossiliferou
			core	100	100%	Sandstone, Grey (wet), medium to fine grained, poorly	
69'9"						sorted, silicious cemented, Very hard, very slightly	
70						calcareas, organic stringers, minor calcite grains	
						almost pure quartz, differentiated compacted, Massive	
					100%	Marlstone Yellowish grey (5Y 7/2) and light grey (N7)	
						V. poorly sorted, calcareous, hard, cross bedded, and	
						differentiated compacted, non fossiliferous, Very	
75						fine bedded, some sandstone beds	
						non fossiliferous [offset of 1/8" at 78' due To compaction]	
			CORE		100%	muscovite small clear flakes, possible	
						biotite or other weathered dark organic material	
79 80		5					

NOTES: 68- 78 100% RQD
79 - 102 100% RQD

FUGRO

7-23-73 L-013

Cannot have high angle bedding here unless something strange is happening. Must be joints -- cross bedding may be possible, but I doubt it.

MP

S OF BORING

BORING NO. P-1 CORE

ELEVATION ______ DATUM ______

WATER LEVEL ______ AFTER ______

LOGGED BY ANN P.

Page 2 of ___

		No.	Type	or Force	Condition	DESCRIPTION color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
80-82		5	CORE		100%	Marlstone, yellowish grey to light grey, thinly bedded, hard, calcareous, some sandstone, organic deposits, some high angle bedding	
82-85		6				Marlstone with interbedded SANDSTONE at 83-84' marlstone, med grey with dark grey interbedded layers, pocket of caliche nodules with associated minerals (silver color possibly arsenopyrite) moderately calcareous, organic material (gilsonite?) present, SANDSTONE med-coarse grained 83-84', med grey, muscovite flakes and organic material, high angle bedding	
85-88		7				SILTSTONE, med grey, other interbeds are darker grey, fine grained thinly bedded, moderately calcareous, pockets of caliche with associated pyrite? crystals organic matter (gilsonite?)	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 9/28/74 TITLE SUN-PHILLPS-SOHIO
START 4:05 AM COMPLETE
EQUIPMENT USED L-W AIR ROTARY
6 3/4 DIAMOND BIT OD

BORING NO. P-1 CORE
ELEVATION DATUM
WATER LEVEL AFTER
LOGGED BY Ann Pizzorusso
Page 4 of _

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		BOX No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
102-105		13	CORE		100%	Marlstone, med dark grey (N4) interbedded with dark grey beds (N3) not (or faintly) calcareous, flat lying beds	
105-108		14				SAME AS ABOVE, at 107.8' lense of sand stone, med grey, med grained with 80% organic material - lenticular and angular deposits	
108-111		15				SAMEAS ABOVE with calcareous med grained lenses of material and organic material interspersed in lenses	
111-114		16				MARLSTONE med gray (N5) fine grained, hard, evenly and thinly bedded, not calcareous except for a minor cavity of calcareous material, lighter bands of fine grained sand	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 9/28 TITLE SUN-Phillips-SOHIO
START 1:10 AM COMPLETE
EQUIPMENT USED L-W AIR ROTARY
6 3/4 DIAMOND BIT OD

BORING NO. P-1 CORE
ELEVATION DATUM
WATER LEVEL AFTER
LOGGED BY Ann Pizzorusso
page 3 of

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		box No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
88-91		8	CORE		100%	Marlstone, yellowish grey to light grey, fine grained, thinly bedded, with variations in bedding color, well consolidated, hard, high angle bedding, fresh, muscovite flakes (clear & small) with some slightly weathered organic material	
91-93		9				SAME AS ABOVE with gilsonite? or other shiny deposit, very soft	
93-96		10				SAME AS ABOVE with pockets of calcareous material and small crystals and flakes of pyrite	
96-99		11				SAME AS ABOVE	
99-102		12				SAME AS ABOVE	

NOTES: 102-132 (30' 5" recovery)

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-1 CORE
DATE 9/29/74 TITLE SUN-PHILLPS-SOHIO
ELEVATION ____ DATUM ____
START 5:30 AM COMPLETE ____
WATER LEVEL ____ AFTER ____
EQUIPMENT USED L-W AIR ROTARY 6 3/4 DIAMOND BIT OD
LOGGED BY ANN PIZZORUSSO
page 5 of ____

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		BOX No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
114-117		17	CORE		100%	Marlstone, med grey (N5) to med dark grey (N4), non calcareous, thinly bedded, hard, organic particles, and some calcareous material are interspersed	
[illegible]120		18				SAME AS ABOVE with sandstone layers containing organic fragments 10-80% depending on the lense.	
120-123		19				SAME AS ABOVE	
123-126		20				SAME AS ABOVE organic fragments 10%	
126-129		21				SAME AS ABOVE, with sandstone lenses pockets filled with calcareous material and sand	
129-131		22				SANDSTONE, med grey, fine grained, finely bedded, lenses of calcareous material and organic matter	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. T-1 CORE
DATE 9/28/74 TITLE SON-PHILLPS-SOHIO
ELEVATION ______ DATUM ______
START 8:00 AM COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED L-W AIR ROTARY
6 3/4 DIAMOND BIT OD
LOGGED BY ANN PIZZORUSSO
page 6 of ___

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		Box No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
132-135		23	CORE		100%	SILTSTONE med dk grey (N4) to med grey (N5) fine grained, fine bedded, poorly bedded in some areas with med grained sandstone and silt, noncalcareous	
[illegible]-138		24				SILTSTONE same as above, slightly calcareous in some pockets, minor organic material	
138-141		25				SAME AS ABOVE	
141-144		26				SAME AS ABOVE, mildly calcareous, lighter grey, more organic fragments	
144-147		27				SILTSTONE med grey (N5) fine even grained, slight thin bedded, mostly well consolidated with organic fragments, non calcareous	
147-151		28				SAME AS ABOVE	

NOTES: 100% recovery 31' to 161

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 9/28/74 TITLE SON-PHILLE-SOHIO
START 2:45 COMPLETE
EQUIPMENT USED L-W AIR ROTARY
6 3/4 DIAMOND BIT OD

BORING NO. P-1 CORE
ELEVATION DATUM
WATER LEVEL AFTER
LOGGED BY Ann Pizzorusso
page 1 of

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
151-154		29	CORE		100%	SILTSTONE med grey (N5), poorly bedded	
						with calcareous material in lenses,	
						organic matter in particles scattered (20%)	
						well consolidated, hard	
[illegible]-157		30				SAME AS ABOVE organic material 5%	
157-160		31				SAME AS ABOVE calcareous lenses larger	
						lighter grey, siltstone areas darker	
						grey with minor organic material	
160-162		32				SILTSTONE, dark grey, grading into light	
						grey in calcareous areas, organic	
						matter and leaf imprints present,	
						pocket of calcareous material and	
						pyrite crystals present	
162-172		33		100	100%	siltstone med light grey (N6) &	
		34				Pale brown (5YR 5/2), Very Thin bedded	
		35				slightly calcareous, (some higher calcareous	
						zones, hard, poorly sorted, some	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068 BORING NO. P-1 core

DATE 9-28-72 TITLE SUN-PHILLPS-SONIO ELEVATION ______ DATUM ______

START ______ COMPLETE ______ WATER LEVEL ______ AFTER ______

EQUIPMENT USED L-W Air Rotary LOGGED BY H. Siembieda

page 8 of _

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
162-172 cont)			core			leaf imprints. [~~[illegible]~~ at 165' a 2"	
						dark zone possible oilshale] at	
						170' Compaction folds obserable.	
						some cross bedding. some Mica	
172-178		36		100	100%	Siltstone, light grey (N6)	
		37				same as above but becominc	
						more massive in character	
						thicknes of beds vary	
178-184		38 39 40				Silstone with some sandstone bed	
						lightgrey N6 to dark grey (N3), hard	
						poorly sorted, silstone thin bedded	
						sandstone 1/8" to 1' beds, slightly	
						calcareous some leaf imprints, compaction	
						clearly evident in sandstone beds	
						mica pressence in small quantities	
184-188		41		100	98.5% ~~[illegible]~~	Siltstone with marlstone, med light	
						grey (N6), Lt olive grey (5Y 5/2) hard, poorly	
						sorted, selectively calcareous, thin bedded	
						non-fossiliferrous	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 72-068
BORING NO. P-1 Core
DATE 9/28/71 TITLE SUN-PHILLPS-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED L-W Air Rotary
LOGGED BY M. Siembieda

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
188-199		42	core	100	100	Sandstone, with some marlstone	
		43				beds, hard, more massive bedding	
		44				ranges from 1" to 5" poorly sorted	
		45				fine-grained, shows more cross beddinc	
						and differentiated compaction. ~~nof~~	
						mon fossiliferrous, some organic strinyen	
						at 196' a 5" zone of medium grain sandstone	
						with biote	~~good contact~~
199-214						Marlstone Lt brown (5YR 6/4) to	
						Lt. grey (N7) hard, Very finly bedded	
						highly calcareous, poorly sorted	
						non fossiliferous, differentiated	
						compact around 214' only with	
						minor offset and folding occurring	
						their, dark zone (N3) at 206-	
						207, a 2" graded sanstone	
						bed (turbidite?) occurs at 212'	
214-217		51	CORE		100%	SILTSTONE, dark grey, fine-grained,	
						thinly bedded, well consolidated, hard	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 9/29 TITLE SUN-PHILLPS-SOHIO
START 12:45 COMPLETE
EQUIPMENT USED LW AIR ROTARY
6 3/4 DIAMOND BIT

BORING NO. 7-1 CORE
ELEVATION DATUM
WATER LEVEL AFTER
LOGGED BY ANN PIZZORUSSO
Page 10 of

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
214-217		51	CORE		100%	not calcareous except for small lenses	
217-220		52				SAME AS ABOVE some organic fragments	
						present	
22[illegible]-223		53				SAME AS ABOVE, grey black (N2)	
223-226		54				SAME AS ABOVE	
226-229		55					
229-232		56					
232-235		57					
235-238		58					
239-242		59	CORE		100%	SILTSTONE grading from med dark	
						grey (N4) to dark grey (N3) to greyish	
						black (N2), some organic matter	
						present - possibly gilsonite, fine	
						grained, grading to almost shale	
						character, thinly bedded in areas	
						grainy texture in areas, friable when cracked	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-01-8

BORING NO. P-1 CORE

DATE 9/29 TITLE SUN-Phillips-SOHIO

ELEVATION ______ DATUM ______

START 8:30 AM COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED L-W AIR ROTARY
6¾ DIAMOND BIT

LOGGED BY ANN PIZZORUSSO

Page 17 of ___

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		Box No.	Type	~~Blows or Force~~ RQD	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
239-242		59	CORE		100%	highly calcareous	
240-242		60				SAME AS ABOVE	
242-245		61					
245-248		62					
248-251		63					
251-251		64					
254-257		65					
257-260		66					
260-263		67					
263-267		68					
267-269		69					
264-285				100%	100%	silty shale medium light grey (N6)	
						had, calcareous, poorly sorted	
						thin bedded, non fossilferous	
						possible "oil shale" at 271';	
						NOTE: This section appears dark	
						due to drilling grease on	
						the core	
						contact with next unit gradational	

NOTES:

FUGRO

7-23-73 L-01

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 9/24/74 TITLE SUN-Phillips-SOHIO
START ______ COMPLETE ______
EQUIPMENT USED L-W Air Rotary

BORING NO. P-1 Core
ELEVATION ______ DATUM ______
WATER LEVEL ______ AFTER ______
LOGGED BY M. Siembieda

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DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	RQD Blo~~ws or F~~orce	Recovery, Condition		
285-298				100%	100%	TuFF Sandstone, light bluish gray (5B 7/1) hard, non-calcareous fine-grained, poorly sorted generally massive, some .5" beds, leaf imprints, inclussion of pyrite organic matter	
298-305				100	100	Same as above at 298.5 brown/green bed (1") possible siltstone (?)	
305-312				100	100	Tuff Sandstone medium light grey (N6), hard fine grained, non calcareous, massive, inclussions of pyrite, biote, possible hornblende, ~~with~~ calcareous material. Stringers of brown siltstone appearing material. 4" bed of calcareous siltstone at 308' medium grain N5	poorly sorted
312-316				100	100	silty Shale, ~~hard~~ medium light grey (N6) hard, poorly sorted, calcareous thin bedded, non fossiliferous	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 9/30 TITLE SUN-PHILLIPS-SOHIO
START 1:00 AM COMPLETE
EQUIPMENT USED L-W AIR ROTARY

BORING NO. P-1 CORE
ELEVATION DATUM
WATER LEVEL AFTER
LOGGED BY ANN PIZZORUSSO

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		BOX No.	~~Type~~ TYPE	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
317-346		86	CORE	98%	100%	SILTSTONE, grayish black (N2), fine grained	
						thinnly bedded, wellconsolidated, hard,	
						veins and pockets of nacolite and	
						calcite, cleavage plain along joint of	
						45° other cleavage occurs along bedding	
						plains	
320-323		87				at 321 nacolite pocket with calcite	
						crystals light grey highly calcareous	
323-376		88				at 325 and 326 well crystalized	
						light gray nacolite crystals	
326-329		89				at 327 joint plane cleavedat 45°	
						nacolite at 328	
329-332		90				SAME	
332-335		91				at 334 nacolite crystals found	
335-338		92				at 337 nacolite lenses crystalized	
						between layers of siltstone	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-1 CORE

DATE 9/30 TITLE

ELEVATION DATUM

START 8:00 AM COMPLETE

WATER LEVEL AFTER

EQUIPMENT USED L-W AIR ROTARY 6 3/4 DIAMOND BIT

LOGGED BY Ann Pizzorusso

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		Box No.	Type	RQD Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
338-341		93	CORE	98%	100%	SAME AS ABOVE	
341-344		94				SAME AS ABOVE at 343 nacolite	
344-346		95				crystals	
346-351			96	75	91%	shale grayish brown 5YR 3/2,	
77						hard, calcareous, thin bedded poorly	sorted ~~[illegible]~~
98						iron pyrite weathered, non fossiliferous	
						(possible oilshale)	
351-376						shales, light grey (N7), hard	
						calcareous, thin bedded, poorly sorted, biotite	
						with beds (.5"→1") of Niccolite	
						and calcite also intergrowths.	
						of Naccolite + calcite in the shale.	
						pyrite inclussions, heavey	
						Naccolite + calcite between	
						363-367. decreasing niccolite	
~~[illegible]~~			104			and calcite below 367,	
						cavity at 370, calcite incrusted	
						Fractures at 354 and 357	
						70° incline	

NOTES: 346-376 (27' recovery 90%)

387' drop of 6"

FUGRO

7-23-73

FIELD LOG OF BORING

Pg 14

PROJECT NO. __________ BORING NO. P-1 Core
DATE 9/30/74 TITLE __________ ELEVATION ______ DATUM ______
START ______ COMPLETE ______ WATER LEVEL ______ AFTER ______
EQUIPMENT USED L-W Air Rotary LOGGED BY M. Siembieda

RQD

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows ~~or~~ Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
376 - 404		705		89	100	Calcareous shale, moderate brown	
		↓				(5YR 3/4) to Pale brown 5YR 5/2,	
						hard, thin beded, poorly sorted	
						non fossiliferous. Nacholite &	
						calcite bed (3") at 284'.	Should be 384'?
						2" sandstone bed, with pyrite	
		1K				medium grain at 403, fractured	
404'-407'		Box 114	DIA. CORE	82%	95%	CLAYSTONE; dusky brn 5YR 2/2 to olive	
						gray 5Y 3/2, hard, thinly bedded, slightly	
						calcareous (10% sol. HCL), slightly to	
						mod. fractured - high angle joints 65°	
						to 85°+, joint surfaces generally v.	
						smooth & clean, minor secondary calcite	
						and clay coatings, nonfossiliferous	
407'-410		Box 115	DIA CORE	86%	100%	407-409 CLAYSTONE; similar to above	
						409-409.5 CLAYSTONE, similar to above	
						but w/ color change to light olive	
						gray 5Y 5/2	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. P-1 (CORE)
DATE 10/1/74 TITLE SUN-PHILLPS
ELEVATION
DATUM
START
COMPLETE
WATER LEVEL
AFTER
EQUIPMENT USED FAILING 2500, 6 3/4 DIA. DIAMOND BIT, AIR
LOGGED BY W.R. LUND

P. 15

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition		
407-410 CONT.		BOX 115	DIA. CORE	86%	97%	409.5 - 410 CLAYSTONE W/ THIN SILTY SANDSTONE INTERBEDS; lt. olive gray 5Y 5/2 to yell. gray 5Y 7/2 (sandstone); thinly bedded, noncalc. to slt. calc., non fractured	
410'-413'		BOX 116	DIA CORE	95%	97%	CLAYSTONE; lt. olive gray 5Y 5/2 to dusky brn. 5YR 2/2, hard, thinly bedded to v. thinly bedded, slt. calc (10% HCL), slt. frac. (one joint 80°+), joint surface clean and smooth, nonfossiliferous; fractures on some bedding planes give impression of colloidal dep.	
413-416		BOX 117	DIA. CORE	73%	90%	CLAYSTONE; dusky brn 5YR 2/2, hard, thinly bedded to v. thinly bedded, slt. calc. to locally mod. calc., mod fractured (high angle joints at 75°+	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15 BORING NO. P-1 (CORE)
DATE 10/1/74 TITLE SUN-PHILLPS ELEVATION ____ DATUM ____
START ____ COMPLETE ____ WATER LEVEL ____ AFTER ____
EQUIPMENT USED FAILING 2500, 6 3/4" DIAMOND BIT, AIR LOGGED BY W. R. LUND

P. 16

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
CONT. 413-416						joints are lightly coated w/ a combination of secondary calcite and clay, nonfossiliferous; 2 thin horizons (1" thick) of a dark colored brittle material - fizzes violently locally - nacolite?? (after Profitt), last 1' of core broken	
416-424		BOX 118	DIA CORE	22%	38%	CLAYSTONE; dusky brn. 5YR 2/2 to v. dusky red 10R 2/2, hard to mod. hard, thinly bedded to v. thinly bedded, slt. calc. (10% HCl), highly fractured, high angle joints to 90°, brittle-crushed zones, extensive secondary calcite and clay, nonfossiliferous - when core was removed from barrel driller commented on presence of clay - possable washed out clay lenses	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15

BORING NO. P-1 (CORE)

DATE 10/1/74 TITLE SUN-PHILLPS

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED FAILING 2500, 6 3/4" DIAMOND CORE, AIR

LOGGED BY W.R. LUND

P. 17

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
424-430		BOX 119	DIA CORE	20%	50%	CLAYSTONE; dusky brn. 5YR 2/2 to	
						v. dusky red 10R 2/2, mod. hard	
						to hard, thinly bedded to v. thinly	
						bedded, slt. calc., highly frac-	
						tured, high angle joints not evident,	
						frac. faces are rough and rugged-	
						slt. secondary calcite, vugs present,	
						vugs and some fractures coated	
						w/ a soft, dk. colored mineral	
						that fizzes violently w/ 10% HCl,	
						slt. petroliferous oder.	
430-433		BOX 120	DIA CORE	90%	100%	CLAYSTONE; dusky red 5YR 2/2 to	
						olive gray 5Y 3/2, hard, thinly bedded	
						to v. thinly bedded, slt. calc.,	
						one rugged frac. at top of core-	
						probably tail end of disturbed	
						zone above, minor sec. calcite on	
						frac. surface, remainder of core	
						v. competent, mechanical fractures	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-EG

DATE 10/1/74 TITLE SUN-PHILLPS

START ______ COMPLETE ______

EQUIPMENT USED FAILING 2500, 6 3/4 DIAMOND CORE, AIR

BORING NO. P-1 (CORE)

ELEVATION ______ DATUM ______

WATER LEVEL ______ AFTER ______

LOGGED BY W. R. LUND

P-18

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
CONT. 430-433						break w/ a v. smooth surface, increasing petroliferous oder.	
433-436		BOX 121	DIA. CORE	100%	100%	CLAYSTONE; dusky yellowish brn 10YR 2/2 to dark gray = N3, hard, v. thinly bedded to thinly bedded, abundant streaks and blebs of soft blk material w brn. streak - gilsonite, some mechanical breaks coated w/ v. fine grained purple mineral - nonfizzing, occ. spots of calcite, slt. oder, veins (horizontal) of calcite mixed w/ some other mineral, no joints.	
436-439		BOX 122	DIA CORE	100%	100%	CLAYSTONE; v. dusky red 10R 2/2, hard, v. thin bedded, sltly to mod calc., one joint +60°, joint faces smooth and clean, gilsonite streaks abundant, slt. oder.	

NOTES:

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7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068-15
DATE 10/1/74 TITLE SUN - PHILLPS
START ______ COMPLETE ______
EQUIPMENT USED FAILING 2500, 6 3/4" DIAMOND BIT, AIR

BORING NO. P-1 (CORE)
ELEVATION ______ DATUM ______
WATER LEVEL ______ AFTER ______
LOGGED BY W. R. LUND
P-19

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
439'-442'		BOX 123	DIA CORE	100%	100%	CLAYSTONE - SILTY CLAYSTONE; dusky brn. 5YR 2/2, hard, v. thin bedded silt content increasing, appearance of small red grains, two joints, >70°; surface partially coated w/secondary calcite, some fracture faces give impression of colloidal dep., slt. to mod. calc, gilsonite still present.	
442-445		BOX 124	DIA CORE	100%	100%	CLAYSTONE - SILTY CLAYSTONE, grayish red 5R 4/2 to dusky brown 5YR 2/2, hard, bedding indistinct mod. to v. calc, nonfrac, occ. gilsonite, less silt w/ depth.	(Note)
445-448		BOX 125	DIA CORE	100%	100%	CLAYSTONE; dusky yellowish brown 10YR 2/2 hard, bedding indistinct, v. calcareous, non fractured, gilsonite still present.	From this point on core becomes v. calc. and locally may be considered a limestone

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. P-1 (CORE)
DATE 10/1/74 TITLE SUN- Phillps
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED FAILING 2500, 6 3/4" DIAMOND BIT, AIR
LOGGED BY W. R. Lund
P. 20

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
448'-451'		BOX 126	DIA CORE	100%	100%	CLAYSTONE; med. gray N5 to mod.	
						brn. 5YR 3/4, hard; bedding indistinct	
						mod. to v. calc, nonfractured, rare	
						gilsonite, slt. odor	
51-454		BOX 127	DIA CORE	100%	100%	CLAYSTONE, dusky brn. 5YR 2/2 to dk.	locally lime-stone
						gray N3, bedding indistinct, hard,	
						v. calc., nonfrac, rare gilsonite	
454-457		BOX 128	DIA CORE	100%	100%	CLAYSTONE-LIMESTONE, dusky brown	Fossils
						5YR 2/2, hard, bedding indistinct, v. calc,	
						nonfrac., occ. gilsonite	
457-460		BOX 129	DIA CORE	100%	100%	CLAYSTONE-(LIMESTONE)??, dusky	
						brn, 5YR 2/2, hard, bedding indistinct	
						calc. but < than above, nonfractured,	
						occ. gilsonite	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068-15

BORING NO. P-1 (CORE)

DATE 10/1/74 TITLE Sun-Phillips

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED FAILING 2500, 6 3/4' DIAMOND BIT AIR

LOGGED BY W. R. LUND

P-21

RQD

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
460-463		Box 130	DIA CORE	100%	100%	CLAYSTONE-LIMESTONE; dusky brn, 5YR 2/2,	
						hard, thinly bedded, v. calc., non	
						fractured, occ. gilsonite	
463-465		Box 131	DIA CORE	100%	100%	CLAYSTONE-LIMESTONE, dusky brn 5YR 2/2,	
						hard, thinly bedded, v. calc., non	
						fractured, occ. gilsonite	
465-495		132	core	100%	100%	marlstone dusty brown (5YR 2/2)	
		↓ 141				hard thinly bedded, poorly	
						sorted, non fossiliferous	
						possible fine pyrite crystals	
						very homogeneus throughout	
						core run. At 478' and 479'	
						1" bed of light grey marlstone	
						some differential compaction	
						seen, also core broken at	
						each bed.	
495-~~485~~ 525		142	cor	99	100	silty shale, Grayish brown	
		↓				$5YR^3/2$, hard thinly bedded	
		151				poorly sorted, varies from	

NOTES: 1855 conductivity 4500
2000 " " 3000

FUGRO

FIELD LOG OF BORING

PROJECT NO.
BORING NO. P-1 Core
DATE 10/1/77 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED L-W Air Rotary
LOGGED BY M Siembieda

P22

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD Blows ~~or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
495-~~425~~525 cont)						slightly calcareous to moderatley	
						calcarcous, non fossiliferous,	
						minon amounts of pyrite and	
						biotite, very homogeneus.	
						core has extremly long length	
						between breaks up to 4' average	
						length of core 3', Rock is brittle	
						will fracture if drop	
525-528		BOX 152	DIA. CORE	100%	100%	CLAYSTONE; dk. gray N-3, hard,	
						thinley bedded, mod. calc., non-	
						fossiliferous, nonfractured, v. good	
						core recovery, ave. lenth 2'.	
528-531		153	Core	100	100	CLAYSTONE: med dk gray N-4, hard,	
						thinly bedded, non fossiliferous, non-	
						fractured, 2" dark zone, good recov	
						ave length 1½'	

NOTES 2300 Conductivity 5300

FUGRO

FIELD LOG OF BORING

PROJECT NO. ______
BORING NO. P-1 core
DATE 10/2/74 TITLE ______
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED L-W Air Rotary
LOGGED BY W. Lund / R. Weber

RQD

23

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
531 - 534		box 154	Core	100	100	CLAYSTONE: N-4 med dk gray, hard thinly bedded with silty interbeds (1-2 mm) nonfossiliferous - nonfractured, good recov. ave length 1 1/2'; slightly calcareous	
534 - 537		155	core	100	100	CLAYSTONE; 5 YR 2/2 'Dusky brown, hard thinly bedded, non fossiliferous - non-fractured, slightly calcareous, v. good recovery, ave length 1 3/4'	
537 - 540		156	core	100	100	CLAYSTONE: 5 YR 2/2 Dusky brown hard, thinly-bedded, non-fossiliferous non-fractured, slightly calcareous exc. recov. ave size 3'	
540 - 543		157	core	100	100	CLAYSTONE: 5YR 2/2 Dusky Brown as above, exc. ave size 7'	

NOTES:

FUGRO

Pg 24

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. P-1 core
DATE 10/2/74 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED
LOGGED BY W Lund / R Weber

P 24

RQD

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	~~Blows~~ ~~of~~ Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
543-546		158	core	100	100	CLAYSTONE: 5 YR 2/2 Dusky	
						Brown, hard non-fossiliferous -	
						nonfractured thinly bedded -	
						slightly carcareous	
546-549		159	Core	100	100	Claystone 5YR 2/2 Dusky Brown	
						as above	
549-552		160	core	100	100	Claystone 5YR 2/2 Dusky Brown	
						as above	
						550' 6" 3/4" horiz dk brown layer	
						possible fossil hash - red brown	
552-555		161	core	100	100	Claystone as above	
						possible fossil hash - red brown	
555-		162	core	100	100	siltly shale Dusky brown ~~to~~	
		↓				5YR 2/2 to Med dark grey (N3)	
		171				hard, poorly sorted thin bedded	
						moderatley calcareous, possible	

NOTES:

FUGRO

FIELD LOG OF BORING Pg 25

PROJECT NO. ______ BORING NO. P-1 Core

DATE 10/2/74 TITLE ______ ELEVATION ______ DATUM ______

START ______ COMPLETE ______ WATER LEVEL ______ AFTER ______

EQUIPMENT USED L-W Air Rotary LOGGED BY M. Siembieda

P25

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
555-585 cont'			core	100	100	biotite and pyrite,	
						lengths of core average 3'	
						some over 4'. Non fractured	
						non fossiliferous. At 571' a 2"	
						bed of sandstone, medium grain	(gilsonite?)
						browish black 5YR 2/1, calcareous	
						At 584 a 5' sandstone, light	
						grey N7 Non-calcareous	
585'-615		172	core	100	100	silty shale, Grayish brown 5YR 3/2	calcareous
		↓ 181				hard, thinly bedded, poorly sorted	
						non-fossiliferous, brittle, generally	
						non fracture (cemented fractures	
						at 612') some oil shale	
						beds (3" at 614, 4' at 607)	
						Very homogeneus throughout	
						core run. A few thin sandstone	
						beds.	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. P-1
DATE 10/3/74 TITLE SUN-PHILLPS
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED FAILING 2500, 6 3/4" DIAMOND BIT AIR.
LOGGED BY W. R. LUND

P-26

DEPTH	SAMPLES			RQD Blows or Force		DESCRIPTION	REMARKS
		No.	Type		Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
615'-618		BOX 182	DIA CORE	100%	100%	Shale; N5 gray to N4 dk. gray, slt. calc., hard, v. thinly bedded-bedding well dev. and exposed in core, non fractured, occ. thin <1" horizontal beds of black material; hard, non calc, v. fine grained to silt	
618-621		BOX 183	DIA CORE	100%	100%	Shale; N4 dk. gray to black N 2.5/, grain size < silt, noncalc. to v. slt. calc, hard, v. thinly bedded-well dev., nonfractured, rx becomes black between 619'3" & 620'8'; strong oder -oilshale?	
621-624		BOX 184	DIA CORE	100%	100%	Shale ⟶ Argillaceaus Limestone; dk. gray N-4 to lt. gray N-7 w/depth. grain < silt, slt. calc ⟶ v. calc. w/depth, hard, v. thinly bedded -well dev., non-fractured, upper portion similar to 618-621, color change & great increase	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15

BORING NO. P-1

DATE 10/3/74 TITLE

ELEVATION DATUM

START COMPLETE

WATER LEVEL AFTER

EQUIPMENT USED FAILING 2500, 6 3/16" diamond bit, AIR

LOGGED BY W.R. LUND

P-27

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						in $CaCO_3$ w/depth	< silt =
							> 90% below upper limit
624-627		BOX 185	DIA CORE	100%	100%	Argillaceous Limestone → Shale;	of silt size
						N-7 lt. gray → N-4 dk. gray to black N2.5,	
						grain size < silt, v. calc. → slt. calc,	
						hard, v. thinly bedded, non frac., non	
						fossiliferous, thin horizons < 1" of	
						black shale occ. from 626'-627'.	
627'-630'		BOX 186	DIA CORE	100%	100%	Shale; dk. gray N-4 to black N-2.5,	
						grain size < silt, slt. calc., hard, v.	
						thinly bedded, nonfrac, nonfossiliferous,	
						occ. horizons black shale, 628'.6" to	
						629.4' silty sandstone (tuffaceous?), N-5	
						gray, fine - med. grained, hard, locally	
						mod. calc.	
630'-633'		Box 187	DIA CORE	100%	100%	SANDY Shale; dk. gray N-4 to dk. reddish gray	
						10R 3/1, 85% grains < silt (minor increase in	
						grain size) pyrite?, slt. calc., hard, v.	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. P-1
DATE 10/3/74 TITLE SUN-PHILLPS
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED FAILING 2500, 6 3/4 DIAMOND BIT, AIR
LOGGED BY W. R. LUND

P-28

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition		
cont 630-633						thinly bedded, nonfrac, non fossiliferous, occ. thin horizons dk. shale and sand stone similar to that descriped in box 186	
33-636		Box 188	DIA CORE	100%	100%	Shale, dk. gray N-4 to dk. reddish gray 10R 3/1, 90-95% below silt cut off, occ. thin stringers of coarser material to fine sand, noncalc. to slt. calc, hard, v. thinly bedded, nonfrac - last 4"-6" badly broken - belive this to be mechanical, occ. black horizons, broken area somewhat coarser - many frac. faces covered with a black, sticky, material - Kerotegen? smells like sulfer.	
636-639		BOX 189	DIA CORE	100%	100%	Shale, dk. gray N-4, grain size < silt, noncalc. to slt. calc., hard, v. thinly bedded, nonfractured, nonfossiliferous	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15

BORING NO. P-1

DATE 10/3/74 TITLE SUN-Phillips

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED FAILING 2500, 6 3/4" diamond bit, Air

LOGGED BY W.R. Lund

P-29

RQD

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
639-642		Box 190	DIA CORE	100%	100%	Shale, dk. gray N-4, grain size < silt, slt. calc., hard, v. thinly bedded, nonfrac., non fossiliferous, 640.3 to 641.5 coarse grained horizon permeated w/ black, tacky, material, definite oder.	
642-645		Box 191	DIA CORE	100%	100%	Silty Shale; dk. gray N-4, grain size increasing 15-20% above silt cut off, noncalc., hard, v. thinly bedded, nonfrac., nonfossiliferous, occ. coarse sand lenses (≤1½") permeated w/ black tacky material	
645-648		Box 192	DIA CORE	100%	100%	Shale; dk. gray N-4, grain size 90% silt-clay, mod. calc., hard, v. thinly bedded, nonfrac., ^nonfrac. nonfossiliferous, black blebs abundant, shiney, strong oder; occ thin sand lenses permiated w/ black material	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. P-1
DATE 10/3/74 TITLE SUN-Phillps-SOHIO
ELEVATION ≈ 5140 DATUM USGS MAP
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED FAILING 2500, 6 3/4 DIAMOND BIT, AIR
LOGGED BY W.R. Lund
P-30

RQD

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
648-651		Box 193	DIA CORE	100%	100%	Shale; dark gray N-4 to Black	
						N 2.5, slt. calc. to mod. calc., hard	
						v. thinly bedded, nonfrac., nonfossilifer	
						ous, occ. thin coarse grained horizons	
						permeated w/ black, semi sticky mat	
651-654		BOX 194	DIA CORE	100%	100%	Shale; dk. gray N-4, grains 90% silt	
						or below, slt. to mod. calc., hard, v. thinly	
						bedded, nonfrac., nonfossiliferous,	
						Coarse silty sand-sandy silt lense 651'4"	
						to 651'8", dark in color, much black,	
						semi sticky material.	
654-657		Box 195	DIA CORE	100%	100%	Shale; dk. gray to dk reddish	
						gray 5R 3/1, >90% grains silt or below,	
						slt. to mod. calc., hard, thinly bedded,	
						nonfrac., nonfossiliferous, two	
						black coarse horizons at ≈ 655' (<1½"	
						thick), last foot v. dk. gray to	
						blk.	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-088-15

BORING NO. P-1

DATE 10/3/74 TITLE Sun-Phillps-SOHIO

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED FAILING 2500, 6 3/4 diamond bit, AIR

LOGGED BY W. R. Lund
P-31

DEPTH	SAMPLES			RQD		DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
657-660		BOX 196	DIA CORE	100%	100%	Shale; dk. gray N-4 to dk. red gray 5R 3/1, slt. to mod. calc., 90% grains silt or below, hard, v. thinly bedded, nonfrac, nonfossiliferous, blebs and thin horizons of black material abundant.	
660-663		BOX 197	DIA CORE	100%	100%	Shale; dk. gray N-4 to dk. red gray 5R 3/1, 90% grains silt or below, slt. calc., hard, v. thinly bedded, nonfrac., non fossiliferous; abundant v. thin coarse horizons - some w/ black material, some oder..	
663-666		BOX 198	DIA CORE	100%	100%	Shale; dk. gray N-4 to dk. red gray 5R 3/1; 90% grains silt or below, slt. calc., hard, v. thinly bedded, nonfrac, nonfossiliferous, occ. v. thin horizons of dk. material	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. P-1
DATE 10/3/74 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED FAILING 2500, 6 3/4" diamond bit, AIR
LOGGED BY W. R. Lund

P-32

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
666-669		BX 199	DIA CORE	100%	100%	Shale; dk. gray N-4, 90% grains	
						silt or below, slt. to mod. calc., hard,	
						v. thin bedded, nonfractured, non-	
						fossiliferous, bitumen stains, 3/4"	
						tuffaceous sandstone at 667'	
669-672		BOX 200	DIA CORE	100%	100%	Shale; dk. gray N-4 to black N-2.5	
						or dk. reddish gray 5R 3/1, 90% grains	
						silt size or below, hard, v. thin bedded	
						nonfrac, nonfossiliferous.	
	Upper WAVEY					At 671'2"	
	BED →					Tuff, white 10YR 8/1 to lt. brownish	
						gray 6/2 occ. grayish brown 10YR 5/2,	
						generally noncalc but locally alteration	
						products do fizz, v. hard - silicous	
						cement, v. fine grained - apparent	
						qtz., mica, feldspars? ← altering	
						nonfractured, general wavey apperance	
						of beds, minor bitumen	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. P-1
DATE 10/3/74 TITLE Sun-Phillps-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED FAILING 2500, 6 3/4" diamond bit, AIR
LOGGED BY W. R. Lund

P-33

ROD

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
672-675		BOX 201	DIA CORE	100%	100%	Tuff, white 10YR 8/1 to lt. brownish	
						gray 10YR 6/2, to gray brown, 10YR 5/2	
						v. similar to that above, locally calc	
			673'4½	→		Shale, dk. gray N-7 to dk. reddish	
						gray 5R 3/1, 90% gains silts size or	
						below, slt. calc., hard, v. thinly bedded,	
						nonfrac., nonfossiliferous, bitumen	
						present.	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068 -15

BORING NO. P-1 - Core

DATE 10/3/74 TITLE

ELEVATION DATUM

START COMPLETE

WATER LEVEL AFTER

EQUIPMENT USED L-W Air Rotary (Falling 2500)

LOGGED BY M. Siembieda

P-34

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
675-705		202	core	100	100	Oil shale, pale brown (5YR 5/2)	
		↓				to Dusky brown (5YR 2/2) hard	
		211				thin bedded, non-fractured	
						Moderatley ~~Non~~ - calcareous, non-fossiliferous	
						very homogeneus throughout	
						core ~~for~~ RUN. Sandstone tuff	
						intervals, 681' (1/8"), 687 (1/8")	
						689' (1/8) 693' (1/8") 701' (1/4") 702 (1/8)"	
						medium grain, very pale orange	
						(10YR 8/2) to medium light grey (N6)	
						medium sorting. Zones of high	
						oil content 702.5' to 705'	
						and possible 697'-698'. length	
						of ~~average~~ unbroken core up to 4'	
						average of 3'	
705-709				100	100	Oil shale pale brown (5YR 5/2) to	
						dusky brown, hard, thin bedded	
						poorly sorted, moderatley calcareous	
						non fossiliferous, grading	
						in to a lighter shale	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74 - 068 - 15
BORING NO. P-1 Core
DATE 10/3/74 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED L-W Air Rotary Failing 2500
LOGGED BY M. Siembredy

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DEPTH	SAMPLES			RQD Blows ~~or~~ Force		DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type		Recovery, Condition		
709-~~725.5~~				10	100	Silt stone and shale grayish	
717						orange (10 YR 7/4) to Moderate	
						brown (5YR 4/4), hard moderatly	
						sorted, moderate to slightly	
						calcareous, non fossiliferous.	
						Fractured, near vertical Joint	
						entire length of section. Some	
						dark bed possible oil shale	
						at 715' and 716'. Core is broken	
						into almost perfect halves by Joint	
717-725.5				100	100%	silty shale, Pale yellowish brown (10YR 6/2)	
				80%		Grayish brown (5YR 3/2), medium gray (N6)	
						hard, thin bedded, poorly sorted	
						non calcareous, non fossiliferous.	
						Vertical Joint extends from 717	
						to 719.5, possible Joint at 722	
						at rough 60°. Some differential compaction.	
725.5 to						Shale and Oil shale with interbeds	
732						of sandstone. Shale: grayish	
						orange pink 5YR 7/2 to Grayish brown 5YR 3/2	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15

BORING NO. P-1 Core

DATE 10/3/74 TITLE

ELEVATION DATUM

START COMPLETE

WATER LEVEL AFTER

EQUIPMENT USED L-W Air Rotary

LOGGED BY M. Siembiedy

P-36

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
725.5 to				[illegible]		hard, varies from non calcareous	
732 cont						to moderatley calcareous, non	
						fossiliferous, differentiated	
						compacted with minion offsets.	
						Sandstone: generally tuffaceous,	non calcarous
						varies in thickness from 1/10" to	
						2" Very Pale orange (10YR 8/2);	
						moderatley sorted. hard, porous	
						At 731 a 3" bed of "gisonitic"	
						sandstone black, soft, porous	
						non calcareous, poorly sorted, core	
						broken at this point.	
						UnKnow. feature at 726, 2" "cavity"	
						filling of some sort, secondary	
						minerals present (Iron-oxide)	
732-735				100	100	Oil Shale dusky brown 5YR 2/2	
						hard, thin bedded, calcarcous	
						non fossiliferous, some compaction	
						of bedding	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. P-1
DATE 10/4/74 TITLE SUN-PHILLPS-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED FAILING 2500, 6 3/4" diamond bit, AIR
LOGGED BY W. R. Lund

P-37

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force RQD	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
735-738'		BOX 222	DIA CORE	100%	100%	SHALE; dk. gray N-4 to blk N1 grading downward to dusky red 5R 3/4 And med. gray N-5, noncalc. to slt. calc., hard, v. thinly bedded - locally differentially compacted, nonfossiliferous, no fractures - irregular parting plane at 735'6" which coincides w/ a 1" tuffaceous zone containing bitumen	
738-741		BOX 223	DIA CORE	100%	100%	SHALE; lt. brownish gray 5YR 4/1, to grayish brown 5YR 3/2, noncalc. to slt. calc., v. thinly bedded, hard, non fractured, nonfossiliferous - homogeneous	
741-744		BOX 224	DIA CORE	100%	100%	SHALE; lt. brownish gray 5YR 4/1 to grayish brown 5YR 3/2, slt. calc., hard, v. thinly bedded, nonfractured, non	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. ______ BORING NO. ______

DATE ______ TITLE ______ ELEVATION ______ DATUM ______

START ______ COMPLETE ______ WATER LEVEL ______ AFTER ______

EQUIPMENT USED ______ LOGGED BY ______

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
CONT. 741-744						fossiliferous, homogeneous.	
744-747		BOX 225	DIA CORE	100%	100%	SHALE; grayish brn. 5YR $^{3/2}$ to lt.	
						olive gray 5Y $^{5/2}$, noncalc. to slt.	
Mahogeney Marker						calc, hard, v. thinly bedded, non-	
						fractured	
			745'5"			Bitumenous Tuff; blk N-1 w/alteration	
						coating mod brn 5YR $^{4/4}$ to lt. brn 5YR $^{5/6}$,	
						mod. to v. calc. - most the alteration	
						product, hard, crudly stratified, hard,	
						apparantly represents a weak zone	
						core broken above it.	
			745' 9"			SHALE, similar to that above marker	
747-750		BOX 226	DIA CORE	100%	100%	SHALE; med. gray N-5 to dk. gray,	
						slt. calc., hard, v. thinly bedded,	
						nonfractured (entire 3' section one	
						piece), nonfossiliferous; occ v.	
						thin sand horizons; pale brn. 5YR $^{5/2}$	
						fine grained, poor to moderatly sorted,	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. ____________________
DATE ________ TITLE ____________________
START ____________ COMPLETE ____________
EQUIPMENT USED ____________________
BORING NO. ____________________
ELEVATION ____________ DATUM ____________
WATER LEVEL ________ AFTER ____________
LOGGED BY ____________________

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RQD

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
Cont 747-750						noncalc, white coating on one end of core zeolite? - nacholite?	
750-753		BOX #227	DIA CORE	100%	100%	SHALE; blk N-1 to dusky red 5R 3/4 or grayish red 5R 4/2, noncalc. to v. slt. calc., hard, v. thinly bedded, one natural parting plane at 750'3" which coincides w/ a 1" thick bitumous tuff horizon, remainder of core is homogeneous.	
753-756		BOX #228	DIA CORE	100%	100%	SHALE; dusky red 5R 3/4 to blkish red 5R 2/2, non to slt. calc., hard, v. thinly bedded, one apparent parting plane at 754'9" coinciding w/ a 1½ thick horizon of marlstone; grayish orange pink 5YR 7/2, mod. hard, calc non fossiliferous	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. ______ BORING NO. P-1 Core

DATE 10/4/74 TITLE ______ ELEVATION ______ DATUM ______

START ______ COMPLETE ______ WATER LEVEL ______ AFTER ______

EQUIPMENT USED L-W Air Rotary LOGGED BY M. Siembreda

P-40

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or~~ Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
756-759		BOX 29	DIA CORE	100%	100%	SHALE; blkish red 5R 4/2 to dusky red 5R 3/4, slt. calc., hard, v. thinly bedded, natural parting plane at 576'9" which coincides w/ a 2½ inch ~~horizontal~~ horizon of white N9 to brnish gray 5YR 4/1, soft, nonfizzing material - nahcolite, nonfossiliferous	
759-760		230		100	100	shale: dusky brown (5YR 2/2) hard, calcareous, non-fossiliferous non fractured, thin bedded	
760-761				100%	50%	Oil shale, (Mahogeney Bed ~~Marker~~ ?) Grayish black (N2) Moderatly hard, Generally massive, calcareous, very distinctive, high oil content	
761-763		231		60%	100	Oil shale, Grayish black (N2) some lighter zones, hard, thin bedded, non fossiliferous possible fractures, differentiated compacted	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. ______ BORING NO. P-1
DATE 10/4/74 TITLE ______ ELEVATION ______ DATUM ______
START ______ COMPLETE ______ WATER LEVEL ______ AFTER ______
EQUIPMENT USED L-W - Air Rotary Faling 2500 LOGGED BY M. Siembieda

P-41

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
763-764				0	100	Nachcolite, translucent, honey	
						color, hacky, vitrous, cavities	
764-765		232		100	100	Siltstone, pale brown (5YR 5/2)	
						hand, thin bedded, highly	
						calcareous, non fossiliferous	
						inclined bedding	
765-766.5				75	100	Oil shale Grayish brown 5YR 3/2	
						moderatley hard, thin bedded	
						slightly calcareous, some	
						thin calcite lenses, high oil	
						content, non fossiliferous	
766.5						Sandstone: dusky brown (5YR 2/2)	
						hard, fine-grain, porous	
						(saturated with oil), H_2S	
						gas present, 2" thick	
766.5 →		233		100	100	Shale grayish orange (10YR 7/4)	
773		234				to Grayish brown (5YR 5/2)	
						hard thin bedded, varies	
						from highly calcareous to	
						moderately calcareous, non-fractured	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO.
BORING NO. A-1 Core
DATE 10/4/74 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED L-W Air Rotary Faling 2500
LOGGED BY M. Siembieda

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
765.5 → 773 cont'						non-fossiliferous. some tuffaceos sandstone at 768 (1") and some very thin (≤.1") [illegible] throughout section	
773-774				80	100	Oil Shale: dusky brown (5YR2/2) moderatley hard, some faint bedding observable, moderatley calcareous, non fossiliferous, non fractured, high oil content	
774-786			235 236 237 238			Siltstone: Pale brown (5YR 5/2) to Grayish brown (5YR 3/2) hard, thin bedded, very fine-grained to clay highly calcareous to slightly calcareous, poorly sorted. High oil content zones 775'-777' and 784-786. Tuffaceous Sandstone porous, hard, medium grained, with some Nacholite at 775 (2") and 785 (2") other ~~thin~~ very thin beds also present	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. ______

DATE 10/4/74 TITLE ______

START ______ COMPLETE ______

EQUIPMENT USED L-W - Air Rotary Failing 2500

BORING NO. P-1 Core

ELEVATION ______ DATUM ______

WATER LEVEL ______ AFTER ______

LOGGED BY M. Siembieda

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
786-789		239		100	100	Siltstone: Very Pale Orange (10YR 8/2) to Pale brown (5YR 5/2) thin beds to medion bedding (2") highly calcareous, fine-grained, poorly sorted non-fossiliferous, non-fractured. a very few, very thin beds (<.1") of tuffaceous Sandstone	
789-819		240 ↓ 249		100	100	Siltstone (with some Shales) pale yellowish brown (10YR 6/2), pale brown (5YR 5/2) and Grayish brown (5YR 3/2), hard to very hard very thin bedded to thin bedded (up to 1/4") with some color banding zones (806.5 - 809., 789-791). NON fossiliferous, non-Fractured, some differential compaction of bedding. Some oil ZONES (moderate grade) 792-795 and 814 to 818. Tuffaceous Sandstone medion grain, moderate sorting	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. ______
BORING NO. P-1 Core
DATE 10/5/74 TITLE ______
ELEVATION ______ DATUM ______
START 10/5/74 COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED L-W-Air Rotary
LOGGED BY M. Siembieda & W.R. Lump

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RQD 1

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
789-819						hard, porous, oil impregnated	
cont'						giving of H_2S gas, [805'(2"),	
						811'(1") 812'(4") 814(1")]	
						and some very thin beds	
						scatten throughout run.	
						819-820'9"	
819-822		BOX 250	3" DIA CORE	100%	100%	Shale; blk N-2 to blkish red 5R 2/2	
						or very dusky red 10R 2/2, slt. calc,	
						v. thinly bedded, hard, nonfractured,	
						nonfossiliferous, bituminous oder	
						820'9"-822'	
						Siltstone; grayish orange pink 5YR 7/2	
						to lt. gray N-7, 90% grains silt size	
						or below, thinly bedded, noncalc to	
						slt. calc., hard, possable nat. parting	
						plane at end of core - beginning of	
						sandstone horizon, nonfossiliferous	
822-825		BOX 251	3" DIA CORE	86%	100%	822-822'1" SILTY SANDSTONE (TUFFACEOUS?);	
						lt. gray N-7, mod. calc., thinly bedded,	poorly sorted,

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068-15 BORING NO. P-1

DATE 10/6/74 TITLE SUN-PHILLPS-SOHIO ELEVATION ______ DATUM ______

START ______ COMPLETE ______ WATER LEVEL ______ AFTER ______

EQUIPMENT USED FAILING 2500, 6 3/4" DIAMOND BIT, AIR LOGGED BY W. R. LUND

P 45

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
CONT. 822-825						hard, bounded by nat. parting planes,	
						nonfossiliferous	
						822'1" - 825"	
						SHALE - SILTSTONE; lt. brnish gray 5YR 6/1	
						to lt. gray N-7, slt. calc., hard, thinly	
						bedded, 7 nat. parting planes - no fractures,	
						2 thin horisons of nachcolite at 823'6"	
						and 823'10", nonfossiliferous, bitumen	
						rare.	
825'-828'		Box 252	3" DIA CORE	100%	100%	825' - 825'10" SHALE - SILTSTONE; lt. brnish	
						gray 5YR 6/1 to lt. gray N-7, v. similar	
						to material directly above, nonfrac. & no	
						parting planes.	
						825'10" - 826'9" SHALE; brnish gray	
						5YR 4/1 to grayish brown 5YR 3/2 and	
						blk N-1, noncalc., hard, v. thinly bedded,	
						no frac or parting planes, nonfossiliferous,	
						bitumen content increasing w/depth	
						to v. rich just above next contact	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068-15

BORING NO. P-1

DATE 10/6/74 TITLE SUN-PHILLPS-SOHIO

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED FAILING 2500, 6 3/4" diamond bit, AIR

LOGGED BY W.R. Lund

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
Cont 825-828						826'9"-828' TUFF - TUFFACEOUS SAND-	
						STONE; grayish orange pink 5YR 7/2 to	
						mod. brn. 5YR 3/4 and locally blk N-1,	
						fine to med. grained, subang. to subrounded,	
						poorly sorted, silica cement, v. hard,	
						noncalc., thinly bedded - beds v. irregular	
						and wavey (similar to Upper Wavey Bed),	
						nonfractured, nonfossiliferous; mineralogy	
						difficult to determine - qtz, abun.	
						alteration products (feldspar - glass shards?),	
						local thin horizons of high bitumen	
						content.	
828-831		BOX 253	3" DIA CORE	80.5%	100%	828' - 828'9" TUFF - TUFFACEOUS	
						SANDSTONE SIMILAR TO THAT DESCRIBED	
						ABOVE, two parting planes one at	
						≈ 35° the other horizontal - surfaces	
						v. rough & irregular.	
						828'9" to 831'. SHALE; grayish brn.	
						5YR 3/2 to dusky brn. 5YR 2/2, 90%	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. P-1
DATE 10/6/74 TITLE SUN-PHILLIPS-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED FAILING 2500, 6 3/4" diamond bit, AIR
LOGGED BY W.R. LUND

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
CONT. 828-831						grains silt size or below, noncalc., hard, nonfractured, nonfossiliferous, 1½ tuffaceous horizon at 830'8" - no parting planes assoc. w/ this bed, local increases in bitumen	
831'-834'		BOX 254	3" DIA CORE	100%	100%	SHALE - SILTSTONE; grayish orange pink 5YR 7/2 to grayish brn. 5YR 3/2 or mod. brn. 5YR 3/4, 90% grains silt or below, noncalc., hard, v. thinly bedded, one nat. parting plane - no fractures, nonfossiliferous, bitumen rare.	
834'-837'		BOX 255	3" DIA CORE	100%	100%	SHALE - SILTSTONE; grayish orange pink 5YR 7/2, to grayish brn. 5YR 3/2, noncalc., v. thinly bedded, hard, one nat. parting plane, no fractures, nonfossiliferous, rare bitumen - v. similar to material above.	
837-840		BOX 256	3" DIA CORE	100%	100%	SHALE - SILTSTONE; grayish orange pink 5YR 7/2 to brnish gray 5YR 4/1, noncalc. to v. slt.	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. P-1
DATE 10/6/74 TITLE SUN-PHILLPS-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED FAILING 2500, 6 3/4" diamond bit, AIR
LOGGED BY WRLund

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
CONT 837-840						calc., v. thinly bedded, hard, ~~one~~ two nat. parting plane - no frac., nonfossiliferous, bitumen v. rare.	
840-843		BOX 257	3" DIA CORE	100%	100%	SHALE - SILTSTONE; brnish gray 5YR 4/1, 90% grains silt or below, noncalc., v. thinly bedded, hard, nonfractured, nonfossiliferous; v. similar to material directly above - bedding somewhat thicker.	
843-846		BOX 258	3" DIA CORE	100%	100%	843'-845'5' SHALE - SILTSTONE; med. lt. gray N-6, 90% grains silt or below, v. slt calc. to slt. calc., thinly bedded, hard, nonfractured, nonfossiliferous - amount of bitumen increasing downward. 845'5"-846' SHALE; grayish brown 5YR 3/2 to brownish gray 5YR 4/1, 90% grains silt or below, noncalc., v. thinly bedded, hard, nonfractured, nonfossiliferous, high bitumen content, definite oder, tacky to touch	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15

BORING NO. P-1

DATE 10/6/74 TITLE SUN - PHILLPS -SOHIO

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED FAILING 2500, 6 3/4" diamond bit, AIR

LOGGED BY WRL

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DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
846'-849'		BOX 259	3" DIA CORE	100%	100%	846'-846'2" SHALE; similar to that described above.	
						846'2"-846'4" VERY RICH BITUMENOUS HORIZON (IN TUFF LENSE??) V. BLK N-1, noncalc., mod. hard to hard, nonfrac. but upper contact bounded by parting plane, nonfossiliferous, slightly sticky to touch, definite oder.	
						846'4"-849' SHALE; grayish red 5R 4/2 to dusky red 5R 3/4 or med. gray N-5, noncalc, v. thinly bedded, one parting plane at 847'3" assoc. with a thin horizon (≈1/2") of bitumen, nonfossiliferous.	
849'-852'		BOX 260	3" DIA CORE	100%	100%	SHALE-SILTSTONE; med gray N-5 to dk. gray N-3 & locally black N-1, 90% silt or finer, noncalc, thinly bedded, hard & brittle, nonfractured, nonfossiliferous.	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. P-1
DATE 10/6/74 TITLE SUN-PHILLPS-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED FAILING 2500, 6 3/4" DIAMOND BIT, AIR
LOGGED BY W.R. Lund

P50

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or~~ Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
852-855		BOX 261	3" DIA CORE	100%	100%	852'-852'3" SHALE-SILTSTONE AS ABOVE	
						852'3"-852'6" BITUMENOUS SHALE; blk	
						N-1, noncalc v. thinly bedded, hard, horizontal	
						natural parting plane near upper contact,	
						nonfossiliferous, parting plane face has	
						small blebs of tar like substance on it.	
						852'6"-855' SHALE-SILTSTONE, grayish red	
						10R 4/2 to med lt gray N-6, noncalc, v. thinly	
						bedded, hard, nonfractured, nonfossiliferous.	
855-858'		BOX 262	3" DIA CORE	100%	100%	SHALE-SILTSTONE; med. lt. gray N-6 to	
						med. gray N-5, noncalc., v. thinly bedded,	
						hard & brittle (difficult to break), one	
						horizontal parting plane at 855'4",	
						nonfossiliferous; bedding v. well dev. alter-	
						nating dk. & lt. horizons give a "candy	
						stripe" appearance, bitumen content	
						increases in last foot.	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. P-1
DATE 10/6/74 TITLE SUN-PHILLPS-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED FAILING 2500, 6¾" diamond bit, AIR
LOGGED BY W. R. Lund
P51

RQD

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
858-861		BOX 263	3" DIA CORE	100%	100%	858 - 858'8" BITUMINUS SHALE; dk. gray N-7 to BLK N-1, noncalc, v. thinly bedded, hard, one horizontal parting plane at 858'5" assoc. w/ a zone of v. high bitumen content, faces sticky, definite oder, non-fossiliferous. 858'8"-861' SHALE-SILTSTONE; lt. gray N-7 to MED LT GRAY N-6, noncalcareous, thinly bedded, hard, two parting planes between 860' and 860'6" - one horizontal the other 25°, nonfossiliferous	
861'-864'		BOX 264	3" DIA CORE	100%	100%	SHALE-SILTSTONE; lt. med. gray N-6 to brnish gray 5YR4/1, noncalc. to slt. calc, v. thinly bedded (locally wavey), hard, one horizontal parting at 862'8", nonfossiliferous.	
864'-867'		BOX 265	3" DIA CORE	100%	100%	SHALE-SILTSTONE; med lt gray N-6 to brnish gray 5YR4/1, noncalc, v. thinly	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15

BORING NO. P-1

DATE 10/6/74 TITLE SUN-PHILLPS -SOHIO

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED FAILING 2500, 6 3/4" diamond bit, AIR

LOGGED BY W. R. Lund

P. 52

DEPTH	SAMPLES			RQD ~~Blows or Force~~		DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type		Recovery, Condition		
CONT. 864-867						bedded, hard, three horizontal parting planes between 864'10" and 865'9"	
867'-870		BOX 266	3" DIA CORE	100%	100%	SHALE-SILTSTONE; lt. brn. gray 5YR 6/1, to lt. gray N-5 noncalc, v. thinly bedded, hard, three parting; 867' and 869'5" 2 are horizontal, one at 45°, nonfossiliferous color becomes lighter w/depth.	
870'-873		BOX 267	3" DIA COR	~~79%~~	89% →	SHALE-SILTSTONE; med. lt. gray N-6 to pinkish gray 5YR 8/1 - color noticably lighter than any rock previously encounted (last 200'), noncalc, v. thinly bedded, hard, 3 horizontal parting planes, ~~4" of core lost between 870'4" and 870'8"~~, brittle, nonfossiliferous	Rx brittle core broke of in hole - recovered on next run
873'-876'		BOX 268	3" DIA CORE	100%	100%	SHALE-SILTSTONE; lt-med gray N-6 to brnish gray 5YR 4/1, noncalc, v. thinly bedded, hard, one horizontal parting plane at ~~374'8"~~ 375', non fossiliferous.	
			Corrected for extra core recovered →				

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-088-15
BORING NO. P-1
DATE 10/6/74 TITLE SUN-PHILLPS-SOHIO
ELEVATION ____ DATUM ____
START ____ COMPLETE ____
WATER LEVEL ____ AFTER ____
EQUIPMENT USED FAILING 2500, 6¾ diamond bit, AIR
LOGGED BY W. R. Lund.

P-53

RQD

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
876-879		BOX 269	3" DIA CORE	100%	100%	SHALE-SILTSTONE; brnish gray 5YR 4/1,	
						noncalc, thinly bedded, hard, one horizontal	
						parting plane at 877'6", nonfossiliferous,	
						below 877'6" abundant v. thin black	
						N-1, v. fine grained coarser horizon, appears	
						to be more of an xllized bituminous	
						material than sand lenses, at 278'4"	
						have blebs of this material ~~almost~~	
						resembles augen structure, bedding	
						appears to have either been drapped	
						over or pushed apart by this material.	
879-909		270		95	100	Siltstone Very Pale orange	
		↓				10YR 8/2 to grayish brown	
		279				5YR 3/2 hard, very fined	
						greined, very thin bedded,	(fine pyrite vl's)
						with some color banding	
						moderately calcareous to slightly	
						calcareous, Non fossi liferous	
						some minor differential	
						compaction. Fractores (Joints)	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. ____ BORING NO. P-1 Core

DATE 10/6/74 TITLE ____ ELEVATION ____ DATUM ____

START ____ COMPLETE ____ WATER LEVEL ____ AFTER ____

EQUIPMENT USED L-W Air Rotary Failing 2500 LOGGED BY M. Siembiedy

54

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
879-909		270				at 883 → 884 (multiple fractures),	
cont'		↓ 279				at 893, 3 horizontal fractures	
						possible vertical, at 903, 4	
						horizontal parting planes	
						886'.5" multiple horizontal planes	
						Tuffaceous Sandstone beds	
						884', 6" (2" bed) 885' (1-½" bed	
						891'. 6" (2" bed) 895' (1" bed)	
						901' (3" bed) 907 (1" bed) 897'.6"	(1" bed)
						hard, porous, slightly calcareous	
						H_2S gas present, oil impregnated	
						medium to fine-grained, moderated	
						sorting	
						887'6" (2" bed) tuff, very	
						fine graine (mean silt size)	
						non-calcareous, poorly sorted	
						moderatley hard, pale yellowish	
						brown (10YR 6/2) some fine	
						grain pyrite crystals	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. ____________

BORING NO. P-1 Core

DATE 10/6/74 TITLE ____________

ELEVATION ____________ DATUM ____________

START ____________ COMPLETE ____________

WATER LEVEL ____________ AFTER ____________

EQUIPMENT USED L-W Air Rotary Failing 2500

LOGGED BY M. Siembieda

P 55

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows / Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
909-939			280	100	100	Siltstone: Very Pale orange (10YR 8/2)	
			284			and pale brown (5YR 5/2) to	
						grayish brown (5YR 3/2), hard,	
						very fine grained, poorly sorted,	
						very thin bedded, with some	
						color banding (bands 1"-2" thick)	
						darker color zone 936-937, varies	
						from slightly calcareous to	
						moderately calcareous tends to	
						become less calcareous at	
						depth, NON-fossiliferous	
						and ~~non calcareous~~ NON-fractured	
						Tuffaceous Sandstone (912' to	
						912'6") Med dark grey N4	
						Massive, fine-grained, hard	
						possible pyrite + biotite	
						slightly calcareous [similar	
						zone at 922'6" (1" Thick)] other	
						tuffaceous Sandstones, lighten	
						in color at 918' (3") 932'8" (1/4")	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. ____ BORING NO. P-1 core

DATE 10/6/74 TITLE ____ ELEVATION ____ DATUM ____

START ____ COMPLETE ____ WATER LEVEL ____ AFTER ____

EQUIPMENT USED L-W Air-Rotary Failing 2500 LOGGED BY M. Siembieda

P 56

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
909-939 cont'						935' (1") 936' (1/4"), some differential compaction generally around sandstone beds.	
39'-942'		BOX 290	3" DIA CORE	100%	100%	939'-940'10" SHALE-SILTSTONE; lt. gray N-7 or lt. brnish gray 5YR 6/1, noncalc, v. thin bedded, hard, horizontal parting planes at 939'8" and 940'9"-faces smooth & clean, nonfossiliferous 940'10"-942' Bituminous Shale; blk. red 5R 2/2, v. dk. red 10R 2/2 to blk N-1, noncalc., v. thinly bedded, hard, horizontal parting plane at 940'11" assoc. w/ the richest oil impregnated zone, nonfossiliferous	
942'-945'		BOX 291	3" DIA CORE	100%	100%	942'-944'2" Bituminous SHALE; blk N-1 to blk red 5R 2/2, noncalc, v. thinly bedded, hard, one horizontal parting plane at 943'; faces cov w/ tar like substance, non fossiliferous	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 72-068-15

BORING NO. P-1

DATE 10/7/74 TITLE Sun-Phillips-SOHIO

ELEVATION ____ DATUM ____

START ____ COMPLETE ____

WATER LEVEL ____ AFTER ____

EQUIPMENT USED FAILING 2500, 6 3/4 diamond bit, rotory/air

LOGGED BY W. R. Lund
P57

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
CONT 942'-945						944'2"-945' SHALE-SILTSTONE; grayish	
						red 5R 4/2, noncalc., v. thinly bedded, hard	
						horizontal parting plane at 944'7, faces	
						smooth & clean, nonfossiliferous	
945'-948'		BOX 292	3" DIA CORE	100%	100%	945'-946' SHALE-SILTSTONE; AS ABOVE	
						946'-948' Bituminous Shale; blk N-1 to med.	
						dk. gray N-4, noncalc., v. thinly bedded,	
						hard, horizontal parting planes at	
						946'5" & 947'4", nonfossiliferous, amount	
						of bituminous material decreasing w/depth	
						results in alternating dark and light horizons	
948-951		BOX 293	3" DIA CORE	100%	100%	SHALE-SILTSTONE; lt. gray N-7 or pinkish	
						gray 5YR 8/1 to med. gray N-5 or brnish gray	
						5YR 4/1, noncalc. to v. slt. calc., thinly bedded,	
						hard, nonfractured, nonfossiliferous, local	
						increases in bitumen content reflected by	
						dking of beds.	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 72-068-15
BORING NO. P-1
DATE 10/7/70 TITLE SUN-Phillps-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED FAILING 2500, 6 3/4 diamond bit, rotary air
LOGGED BY W.R. Lund

P.58

DEPTH	SAMPLES			RQD ~~Blows or Force~~		DESCRIPTION	REMARKS
		No.	Type		Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
951-954'		BOX 294	3"DIA CORE	89%	100%	SHALE-SILTSTONE; lt. gray N-7 to med. gray N-5, noncalc., v. thinly bedded, hard, three horizontal parting plane between 953'5" and 953'10", nonfossiliferous	
[illegible]4'- 957'		BOX 295	3"DIA CORE	100%	100%	SHALE-SILTSTONE; lt. gray N-7 to med. gray N-5, noncalc. to slt. calc. w/depth, v. thinly bedded, hard-core recovery as one piece, nonfossiliferous, bitumen rare, v. simalar to rx in 951-954 interval	
957'-960'		BOX 296	3"DIA CORE	95%	100%	SHALE-SILTSTONE; pinkish gray 5YR 8/1 to med. dark gray N-4, noncalc. to locally mod. calc., v. thinly bedded - one 1½" thick bed inclined at ≈ 10° to other beding between 957'2" and 957'4"; this bed is bounded above and below by thin calcite veins, two horizontal parting planes at 958'2" and 958'4"	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 72-068-15
BORING NO. P-1
DATE 10/7/74 TITLE Sun-Phillps-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED FAILING 2500, 6 3/4 diamond bit, rotory/air
LOGGED BY W. R. Lund
P. 59

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force RQD	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
960'-963'		BOX 297	3" DIA CORE	100%	100%	960'-962'10" SHALE-SILTSTONE; lt. gray N-7 to grayish brown 5YR 3/2, noncalc to locally sltly calc, v. thin bedded-bedding is differentially compacted in lower portion of core resulting in a wavey appearance, hard, nonfrac, nonfossiliferous. 962'10"-963' Bituminous Shale; blk N-1 to dusky brn. 5YR 2/2, noncalc., thin to med. bedding-bedding thickens & thins locally resulting in a wavey appearence, nonfrac, nonfossiliferous	
963-966		BOX 298	3" DIA CORE	100%	100%	Bituminous Shale; blk N-1 to grayish brn. 5YR 3/2, noncalc., thin to med. bedded bedding thickens & thins locally-creating a wavey ~~apperance~~ to core, hard, horizontal parting plane at 963'10"-face smooth covered w/ black material, local increases in oil content produce banded apperance thin <1/2" rich bituminous vein at bottom of core.	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 72-068-15

DATE 10/7/79 TITLE SUN-Phillips-SOHIO

START ______ COMPLETE ______

EQUIPMENT USED FAILING 2500, 6 3/4 diamond bit, rotory air

BORING NO. P-1

ELEVATION ______ DATUM ______

WATER LEVEL ______ AFTER ______

LOGGED BY W. R. Lund

P-60

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	~~Blows or Force~~ RQD	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
966-969		BOX 299	3" DIA CORE	100%	100%	966'-967'7" SHALE-SILTSTONE; grayish red 10R 4/2 to brnish gray 5YR 4/1, noncalc., thinly bedded (locally wavey), hard, nonfractured, nonfossiliferous. 967'7"-968' CALCAREOUS SHALE-Marlstone lt. gray N-7, pinkish gray 5YR 8/1 or med. lt. gray N-6, calcareous, v. thinly bedded, hard - appearance v. similar to rx. above and below but calc. 968'-969' SHALE-SILTSTONE; similar to that described above the calcareous zone.	
969'-972'		BOX 300	3" DIA CORE	100%	100%	969-971'2' SHALE-SILTSTONE; lt. gray N-7 to med. lt. gray N-6, noncalc., v. thinly bedded, hard, nonfractured 971'2"-972 Bituminous SHALE; brnish blk 5YR 2/1, noncalc, v. thinly bedded, hard, horizontal parting planes at 971'6" and 971'10", nonfossiliferous	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 72-068-15
BORING NO. P-1
DATE 10/7/74 TITLE Sun-Phillps-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED FAILING 2500, 6 3/4 diamond bit Rotory/air
LOGGED BY W. R. Lund
P-61

RQD

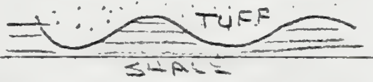
DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
972-975		BOX 301	3" DIA CORE	100%	100%	972'-972'4" SHALE-SILTSTONE; olive	
						gray 5Y 3/2, noncalc., v. thinly bedded,	
						hard, nonfrac.	
						972'4"-972'7": Bituminous SHALE;	
						BLK N-1 to brnish blk 5YR2/1, noncalc.,	
						v. thinly bedded, hard, nonfrac., occ.	
						v. thin interbeds of tuffaceous	
						material, pale brown 5YR 5/2.	
						972'7"-972'9" TUFF; dk. yellowish brn	
						10YR4/2, v. fine grained w/ abundant alter-	
						ation-mineralogy inteterminant, noncalc,	
						indistict bedding, hard (possable	
						silica cement), horizontal parting plane	
						through this horizon, nonfossiliferous	
						972'9"-973'5" Bituminous Shale And	
						TUFF; BLK N-1 (shale), dk. yellowish	
						brn 10YR 4/2 (tuff), alternating thin	
						beds of tuff and shale w/ a 1"	
						tuff horizon forming the base of	
						this sequence - bottom of this tuff	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. P-1
DATE 10/7/74 TITLE SUN - Phillips - SOHIO
ELEVATION ____ DATUM ____
START ____ COMPLETE ____
WATER LEVEL ____ AFTER ____
EQUIPMENT USED FAILING 2500, 6 3/4" diamond bit rotary air.
LOGGED BY W.R. Lund
P-62

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
CONT 972-975'						is very wavey 	
						973' 5" - 973'10" SHALE-SILTSTONE; lt. gray	
						N-7 to grayish orange pink 5YR 7/2,	
						noncalc. to slt. calc., v. thinly bedded,	
						hard, nonfractured	
						973'10" - 975' SILTY SANDSTONE - SANDY	
						SILTSTONE; WHITE N-9 to pinkish	
						gray 5YR 8/1, v. fine sand and silt,	
						subrounded to rounded, poorly sorted,	
						mod. calc. ($CaCO_3$ cement), hard, qtz	
						and muscovite are predominente minerls,	
						Fracture surfaces have a sacroidal	
						texture.	
975'-978'		BOX 302	3" DIA CORE	100%	100%	975 - 975' 10' SILTY SANDSTONE - SANDY	
						SILTSTONE; AS ABOVE	
						975'10" - 978' SHALE - SILTSTONE; lt. olive	
						gray 5Y 6/1, noncalc, v. thinly bedded, hard,	
						nonfractured, nonfossiliferous	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. P-1
DATE 10/7/74 TITLE SUN-Phillips-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED FAILING 2500, 6 3/4" diamond bit, rotory air
LOGGED BY W. R. Lund

P. 63

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	ROD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
978-981		BOX 303	3"DIA CORE	100%	100%	978'-978'6"; SHALE-SILTSTONE AS ABOVE	
						978'6"-981' Bituminous Shale; blk N-1	
						to brnish blk 5YR $^{2}/_{1}$, noncalc, v. thinly	
						bedded, hard, nonfractured, abundant	
						thin irregularly shaped tuff?	
						stringers w/ a 1" tuff "breccia" lense	
						at 978'8"	
981'-984'		BOX 304	3"DIA CORE	100%	100%	981-983'1" Bituminous SHALE; blk N-1	
						to brnish blk 5YR $^{2}/_{1}$, noncalc to slt.	
						calc, v. thinly bedded, hard, horizontal	
						parting plane at 982'9" - faces covered	
						w/ a tar like substance, abundant	
						irregular tuff? stringers.	
						983'1"-984' Marlstone; pinkish gray	
						5YR $^{8}/_{1}$ to brnish gray - 5YR $^{4}/_{1}$, v. calc.	
						v. thinly bedded, nonfractured, non	
						fossiliferous - locally sand content	
						increases.	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. P-1
DATE 7/10/74 TITLE SUN-Phillps-50410
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED FAILING 2500, 6 3/4" diamond bit, rotary air.
LOGGED BY WR Lund

P. 64

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	ROD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
984'-987'		BOX 305	3" DIA CORE	100%	100%	984-986' MARLSTONE; white N-9 to pinkish gray 5YR 8/1, v. calc, v. thinly bedded, hard, horizontal parting plane at 984'2", nonfossiliferous 986-987 SHALE-SILTSTONE; lt. brnish gray 5YR 6/1 to brnish gray 5YR 4/1, slt. to mod. calc, v. thinly bedded, hard, nonfractured	
987'-990'		BOX 306	3" DIA CORE	100%	100%	987'-987'4" SHALE-SILTSTONE SIMILAR TO ABOVE 987'4'-989'7' MARLSTONE; white N-9 to pinkish gray 5YR 8/1, v. calc., v. thinly bedded, hard, nonfrac., nonfossiliferous, locally sandy (v. fine qtz.) 989'7"-990 Bitumenous Shale; blk N-1 to brnish blk 5YR 2/1, noncalc. to v. slt. calc, v. thinly bedded, hard, nonfractured, nonfossiliferous, pyrite?	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15.

BORING NO. P-1

DATE 10/7/74 TITLE SUN-Phillps-SOHIO

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED FAILING 2500, 6 3/4" DIAMOND BIT, Rotory air.

LOGGED BY W. R. Lund.

P 65

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
990-993		BOX 307	3" DIA CORE	100%	100%	Bitumenous Shale; brnish gray 5YR 4/1	
						to brnish blk. 5YR 2/1, noncalc, v. thinly	
						bedded, hard, two horizontal parting	
						planes at 990'11" and 992'7", nonfossil	
						iferous	
993'-996'		BOX 308	3" DIA CORE	100%	100%	993-994 Bituminous Shale; similar to above	
						994-996: Shale-SILTSTONE; olive	
						gray 5YR 4/1, noncalc, v. thinly bedded,	
						hard, non frac., nonfossiliferous	
996-999		BOX 309	3" DIA CORE	92%	100%	SHALE-SILTSTONE; olive gray 5YR 4/1,	
						noncalc, v. thinly bedded, hard, 4 horizontal	
						parting planes at 996'4", 997'5", 997'7"	
						997'11", nonfossiliferous.	
999 -		310		98	100%	Shale: Very light grey (N8) to	
1017		311				dusky brown 5YR 2/2 hard,	
		312				Very thinly bedded, slightly calcareous	
		314				to modernatley calcareous, poorly sorted	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO.
DATE 10/7/74 TITLE
START COMPLETE
EQUIPMENT USED L-W Air Rotary Failing 2500

BORING NO. P-1 Conr
ELEVATION DATUM
WATER LEVEL AFTER
LOGGED BY M. Siembieda
66

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
999-1017						homogenous throughtout zone	
cont						possible pyrite and ~~[illegible]~~	
						mica (Phloga~~th~~ite?), some	
						silt beds, some H_2S gas	
						present, non-fossili ferous	
1017-1021			315	70	100	Siltstone: Pale yellowish brown	
			316			(10YR 6/2) hard, thinly bedded	
						color banding, very fine-grained	
						moderatley calcareous to highly	
						calcareous, slight ~~[illegible]~~ porous	
						with H_2S gas present	
						Zones of high mica content	
						~~[illegible]~~, differentiated	
						compacted, ~~[illegible]~~ non-fossiliferour	
						some interbedded sandstones,	
						cross-bedded	
1021-1029			317	100	100	shale: lightgrey (N 7) to dusky	
			318			yellowish brown (10YR 2/2), hard	
			319			thinly bedded ~~[illegible]~~ious	
						(faintly developed, not too obvious)	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO.

DATE 10/7/74 TITLE

START COMPLETE

EQUIPMENT USED L-W Air Rotary Failing 2500

BORING NO. P-1 Core

ELEVATION DATUM

WATER LEVEL AFTER

LOGGED BY M. Siembieda

67

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1021-1029						moderatley to slightly calcareous	
cont						some pyrite possible mica, non-Fossiliferous	
						Darker Zone between 1024' 9"	
						to 1025' 6", contains sandstone	
						lenses and is differentiated compacted.	
						sandstone bed at 1025'11' (1/2")	
						and at 1027' 6" (1/4")	
1029-1056						Shale: Medium dark grey (N4)	
						to dusky yellowish brown (10YR 2/2)	
						hard, thinly bedded, moderatley	
						calcareous, non-fossiliferous	
						poorly sorted. Three vertical	
						Joints between 1040 to 1045	
						the ZONE is broken up in small	
						pieces, Joints are smooth and	
						flat, closed. At 1045'6"	
						sandstone (Tuff) pale yellowish	
						orange (10YR 8/6) and dark grey (N3)	
						medium and fine grain beds, differentiated	
						compacted around beds, slightly	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-E5
BORING NO. P-1 Core
DATE 10/7/74 TITLE SUN-Phillips-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED L-W - Air Rotary Failing 2500
LOGGED BY M. Siembiedy
68

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1024-1056						calcareous, at 1034 Tuff sandstone (2")	
cont'd						greenish black (5G 2/1) soft	
						slightly calcareous, possible	
						pyrite that has been weathered	
						out	
056 –				100	100	Siltstone; medium light grey (N6)	
1059						hard, thinly bedded to	
						thick bedded (4"), more massivey	
						in characteristic than previous ZONE	
						Non-fossiliferous non-fractured	
						moderatley calcareous to highly	
						calcareous, some cross-bedding	
						and differentiated compacted	
1059-1062		Box 330	3" DIA CORE	98%	100%	SHALE-SILTSTONE; med. lt. gray N-6	
						to olive gray 5Y 3/2, noncalc., v.	
						thinly bedded, hard, 3 horizontal	
						parting planes at 1059'6", 1059'7"	
						1060'1", nonfossiliferous.	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. P-1 (CORE)
DATE 10/8/74 TITLE SUN- Phillips - SOHIO
ELEVATION ____ DATUM ____
START ____ COMPLETE ____
WATER LEVEL ____ AFTER ____
EQUIPMENT USED FAILING 2500, 6 3/4 diamond bit, air/rotory
LOGGED BY W. R. Lund

P. 69

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1062'-1065'		BOX 391	3" DIA CORE	95%	100%	SHALE-SILTSTONE; pale yellowish brown	
						$10YR^{6/2}$, olive gray $5Y^{3/2}$, to med. lt.	
						gray N-6, noncalc., v. thinly bedded,	
						hard, horizontal parting planes at 1063'2"	
						and 1063'10", parting plane fractures have	
						hackly fracture	
1065-1068		BOX 332	3" DIA CORE	79% ~~100%~~	100%	SHALE-SILTSTONE; pinkish gray $5YR^{8/1}$	
						to brnish gray $5YR^{4/1}$, slt. to mod.	
						calc. locally, thinly bedded, hard,	
						numerous horizontal parting planes,	
						beds thicken locally, occ. thin horizons	
						of sandy siltstone (sacroidal text) and	
						calc. shale - marlstone, locally bedding	
						appears trunkated.	
1068-1071		BOX 333	3" DIA CORE	100%	100%	Intebedded Shale and Sandy Shale;	
						mod. brn. $5YR^{4/4}$, grayish brown $5YR^{3/2}$ to	
						grayish red $5R^{4/2}$, noncalc to mod. calc,	
						thinly bedded (<1/8" >1 1/2"), hard, horizontal	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. P-1 (core)
DATE 10/8/74 TITLE SUN-Phillips-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED FAILING 2500, 6 3/4" diamond bit, air rotory
LOGGED BY W. R. Lund
P. 70

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						parting planes at 1068'3", 1068'6", 1069'3" 1068'8", nonfossiliferous, alternating colors give rock a banded appearance, sand is qtz.	
1071-1074		BOX 334	3" DIA CORE	100%	100%	SHALE-SILTSTONE; olive gray 5Y 3/2, noncalcareous, v thinly bedded, hard, horizontal parting planes at 1071'8", 1072'4" 1073'1", faces are smooth & speckled w/ pyrite, nonfossiliferous	
1074-1077		BOX 335	3" DIA CORE	100%	100%	1074'-1074'5" SILTSTONE-SHALE; olive gray 5Y 3/2 to dusky brown 5YR 2/2, noncalc., v. thinly bedded, hard, nonfractured, no parting planes 1074'5" - 1074'7" SILTSTONE (TUFFACEOUS?), dk. gray N-5, noncalc, single bed, hard, core broke in this interval, nonfossiliferous, strong oder - doesn't appear to be oil impregnated. 1074'5" - 1077 SILTSTONE - SHALE; simalar to	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. P-1 (core)
DATE 10/8/74 TITLE SUN-Phillps-SOHIO
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED FAILING 2500, 6 3/4" diamond bit, air rotory
LOGGED BY W.R. Lund

P-71

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						above.	
		BOX	3" DIA	100%			
1077-1080		336	CORE	~~[illegible]~~%	100%	SHALE-SILTSTONE; lt. brnish gray 5YR6/1	
						to brnish gray 5YR4/1 to med. dk. gray	
						N-4, noncalc, v. thinly bedded, hard,	
						horizontal parting planes at 1078'3'	
						1078'9", 1079'8", nonfossiliferous	
		BOX	3" DIA				
1080-1083		337	CORE	100%	100%	1080'-1080'10" SHALE-SILTSTONE; AS ABOVE	
						1080'10"- 1080'18" Bituminous shale; blk N-1,	
						noncalc., thinly bedded, hard.	
						1080'10" - 1082'1"; CLAYSTONE; med. dk.	
						gray N-4, noncalc, med. to thickly bedded,	
						hard, nonfrac., lower 6" of this horizon	
						studed w/ pyrite xlls.	
						1082'1'-1083 SHALE-SILTSTONE; similar	
						to above at beginning of box.	
		BOX	3" DIA				
1083'-1086'		338	CORE	100%	100%	CALCAREOUS SHALE-Locally Marlstone	
						lt. gray N-6, mod. to v. calc., thinly bedded,	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. P-1 (CORE)
DATE 10/8/74 TITLE SUN-Phillips-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED FAILING 2500, 6 3/4" diamond bit, AIR/ROTORY
LOGGED BY W.R. Lund

P-72

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						hard & brittle, horizontal parting planes at 1083'6" and 1084'6", nonfossiliferous, parting plane surfaces have a sacroidal text.	
[illegible]086-1089		BOX 339	3" DIA CORE	100%	100%	SILTSTONE-CLAYSTONE; med gray N-5 to brnish gray 5YR 4/1, noncalc, thin to medium bedded, hard, nonfractured, horizontal parting plane at 1086'3", parting plane face speckled w/ pyrite and shortite ?, nonfossiliferous.	
1089-1092		BOX 340	3" DIA CORE	85 1/2 %	95-100%	Shale-Siltstone; grayish olive 10Y 4/2, slt. calc., v. thinly bedded, hard, broken up, most fractures represent horizontal parting planes - hacky fracture on faces, nonfossiliferous.	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15

BORING NO. P-1 (Core)

DATE 10/8/74 TITLE SUN-Phillips - SOHIO

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED FAILING 2500, 6 3/4" diamond bit, Rotary/air

LOGGED BY ______

P-73

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1092-1095		Box 341	3" DIA CORE	86%	100%	Siltstone-shale; lt. gray N-7 to med. lt. gray N-6 slt. calc. v. thinly bedded, hard, broken up - horizontal parting planes, nonfossiliferous	
95-1098		Box 342	3" DIA CORE	83%	100%	Siltstone-shale; lt. gray N-7 to med. lt. gray N-6 slt. calc to locally mod. calc., v. thinly bedded, hard, fractured - horizontal parting planes & rubbel, nonfossiliferous, end marlstone	
1098-1101		Box 343	3" DIA CORE	100%	100%	Marlstone; white N-9 to med lt. gray N-6, v. calc., thinly bedded - bedding locally contorted w/ many roll and loop structures, nonfractured, horizontal parting planes at 1098'4", 1099'5" and 1100'2", nonfossiliferous, faces have a sacroidal texture - v. small grains of a dk. mineral give a "salt and pepper appearence	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. P-1 (CORE)
DATE 10/8/74 TITLE SUN-Phillips-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED FAILING 2500, 6 3/4" diamond bit, air/rotary
LOGGED BY Steinbrueder
P-74

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1101-1104		BOX 344	3" DIA CORE	100%	100%	Marlstone; lt. gray N-6 to med. lt. gray N-5, v. calcareous, v. thinly bedded, hard one horizontal parting plane 1102'5", occ. shale interbeds in last 6"	
04-1107		BOX 345	3" DIA ~~CORE~~	100	100	SILTSTONE-SHALE; med. lt. brn to grayish brn 5YR 3/2, slt. to mod. calc, v. thinly bedded, hard, horizontal parting planes at 1104' 7" & 1106' 2", nonfossiliferous	
1107-1110		BOX 346	3" DIA CORE	100	100	Shale-Siltstone; med. gray N-5, med lt. gray N-6, mod. calc., thinly bedded, hard horizontal parting planes at 1107' 10", 1108' 5", 1108' 10", 1109' 2", nonfossiliferous.	
1110-1113		BOX 347	3" DIA CORE	100	100	Shale-Siltstone; v. lt. gray N-7, slt. calc., horizontal parting planes at 111' 3" 111' 6", 1112' 2" otherwise similar to above.	

NOTES:

FUGRO

FIELD LOG OF BORING

119.5, 119.9

PROJECT NO. 74-068-15
BORING NO. P-1 (CORE)
DATE 10/8/74 TITLE SUN-Phillps-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED FAILING 2500, 6 3/4" diamond bit, rotory/air
LOGGED BY W. R. Lund
P-75

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	~~Blows or Force~~	Recovery, Condition		
1113-1116		BOX 348	3" DIA CORE	98%	100%	SHALE-SILTSTONE; brnish gray 5YR 4/1	
						to grayish blk. N-2, slt calc., v. thinly	
						bedded, hard, horizontal parting	
						planes at 113'5", 1113'7", 114', 114'4",	
						nonfossiliferous	
16-1140		349		96	100	Siltstone, pale yellowish brown	
		350				(10YR 6/2), medium light grey, N6 medium	
		351				hard to hard, thinly bedded, (may	(126'10' parting
		352				appear massive) some color banding	plane;
		353				poorly sorted, highly calcareous, (slightly coarser at upper contact)	
		354				non-fossiliferous, pyrite (arsonopyrite ?)	
		355				homogeneous. Sandstone 1119'5" to	
		356				119'9", black (N?), soft, fine to	
						medium grain, moderatley calcareous,	
						porous, oil impregnated, sharp	
						contact, breaks at contact.	
						shale 1226', ~~Kcr~~ dark	
						grey (N3) hard, parting planes	(6" thick)
						above this zone differentiated	
						compacted minor offset	

NOTES:

FUGRO

FIELD LOG OF BORING

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35 6

PROJECT NO. 74-068-15

BORING NO. P-1 (CORE)

DATE 10/8/74 TITLE Sun-Phillps-SOHIO

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED Failing 2500, 6 3/4" diamond bit, rotory/air

LOGGED BY M. Siembiedr

P-76

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1140' -		356		99	100	Interbedded, shale, siltstones and	
1149 8'		357				sandstone, Olive grey (5Y 3/2) pale	
		358				yellowish brown (10YR 6/2), light	
						grey (N7), moderatley hard to	
						hard brittle, thinly bedded	
						slightly calcareous, non fossiliferous	
						a ~~Tuff~~ differential compacted	
						Tuff 1144'6" (1/4") soft	
1145.8						Friable Moderate brown 5YR 4/4	
~~[illegible]~~8				85%	100%	TuFF, Verlight grey (N8) to light	
1148.3						grey (N7), soft to moderately hard	
						very fine grains moderatley	
						sorted, Non calcareous NON-fossiliferous	
						Non-fractured. Parting planes	
						1146'11" (very fine tuff)	
1148.5				100	100	Shale (Mudstone?) greenish grey	
1153.6						(5GY 6/1) Medium light grey	
						hard thinly bedded, non fossiliferous	
						Non-calcareous, some interbedded	
						Tuffs (Very Pale orange 10YR 8/2	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-1 (CORE)
DATE 10/3/74 TITLE SUN-PHILLIPS-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED Failing 2500, 6 3/4" diamond bit rotory/air
LOGGED BY M. Siembieda

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1148'5"						At 1150'3" sandstone tuff bed	
1153'6"						1" thick slighty calcareous, medium	
cont						gain. Between 1150'3" to 1152'6'	
						a set of (3) vertical Joints	
						smooth, concave reggular (core is	
						split)	
1153'6						Siltstone Medium light grey (N6)	
1156						dark Yellowish brown 10YR 4/2	
						hard, thinly bedded, very poorly	
						sorted, moderatley calcareous	
						parting planes at 1154"6"	
						Non-fossiliferous	
1156-				90	100	Shale (Mudstone) medium grey (N5)	
1161'10"						To dusky brown 5YR 2/2, hard	
						thinly bedded color banding	
						NON-Fossiliferous, varies from	
						slightly to Moderatly calcareous	
						some cross bedding and	
						differential compaction,	
						Joints (3) from 1157' to 1158'6"	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068

DATE ~~8~~10/8/74 TITLE SUN - PHILLIPS - SOHIO

START ______ COMPLETE ______

EQUIPMENT USED Failing

BORING NO. P-1 (CORE)

ELEVATION ______ DATUM ______

WATER LEVEL ______ AFTER ______

LOGGED BY M. Siembieda

78

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1156						Smooth, flat regular, 3 Ma for (~~[illegible]~~)	
1161' 10"						At 1159' 6" a 1" oil bearing (Tar Sand)	
cont						zone, oozes stains surrounding	
						rock, soft, black, sticky	
1161' 10"				100	100	Silty shale: olive grey (5Y 4/1)	
1163' 4"						very slightly calcareous, Massive	
"						(some faint bedding) hard, non fossiliferous	
						Non fractured	
1163' 4"				100	100	silty shale dark greenish grey	
1164' 7"						5GY 4/1, hard, Non calcareous	
						thin bedded and some massive beds	
						~~to~~ very well sorted, non fossiliferous	
						Non-fractured	
1164' 7"				100	100	Sandstone pinkish grey (5 YR8/1)	
1169' 8"						to ~~[illegible]~~ light grey (N7), moderatley	
						hard, moderatley calcareous	
						medium to fine-grained, generally	
						massive, some fine bedding;	
						parting surface at 1168' 6"	
						at rough 30° angle from horizontal	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068

DATE 10/8/74 TITLE SUN-PHILLIPS-SOHIO

START ______ COMPLETE ______

EQUIPMENT USED Failing 2500

BORING NO. P-1 (CORE)

ELEVATION ______ DATUM ______

WATER LEVEL ______ AFTER ______

LOGGED BY M. Sieinbieda

79

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1169' 8"				100	100	Silty shale dusky brown 5YR2/2	
1173' 6"						hard; thinly bedded, color	
						banding, slightly calcareous	
						& increasing at depth, non-	
						Fossiliferous, non fractured,	
						some thin tuffaceous sandstone	
						less than 1/8".	
1173' 6"				100	100	TuFF, (sandstone?) very pale orange	
1176-						10YR 8/2 to pale yellowish brown	
						10YR 6/2, soft to moderatley	
						hard, fine to coarse-grain	
						well sorted (localize homogeneus	
						zones) moderatley to highly	
						calcareous, inclussion of	
						pyrite (arsenopyrite?)	
						massive to thinly bedded	
						non-fractured. At 1175' 3"	
						becomes coarser and more massive	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068-15

BORING NO. P-1 (CORE)

DATE 10/9/74 TITLE SUN-Phillps-SOHIO

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED FAILING 2500, 6 3/4" diamond bit, rotary/air

LOGGED BY W.R. Lund

P. 75

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1176'-1179'		BOX 369	3" DIA CORE	81%	100%	1176'-1177'1" TUFF-TUFFACEOUS SILTSTONE; pinkish	
						gray 5YR $^{8/1}$, 95% grains silt or below,	
						poor to moderate sorting, mod. hard,	
						calcareous, bedding indistinct - may	
						be massive, occasional fine grains	
						of muscovite, irregularly shaped blebs	
						on parting faces may indicate highly	
						weathered pumice lumps, parting	
						plane at 1176'-1"	
						1177'1" - 1177'3" Interbedded siltstones	
						and tuff; pinkish gray 5YR $^{8/1}$ to	
						dk. greenish gray 5G $^{4/1}$, slt. calc.	
						to calc., mod. hard to hard, nonfractured,	
						base of this unit is a tuff breccia	
						w/ shale matrix, bedds are contorted	
						1177'3" - 173'3" SHALE-MUDSTONE; lt.	
						brnish gray 5YR $^{6/1}$ to grayish orange pink	
						5YR $^{7/2}$ - locally mod. brn 5YR $^{3/4}$, noncalc.	
						to slt. calc, thinly bedded, hard, hor-	
						izontal parting plane at 171'11' assoc.	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-1
DATE 10/9/74 TITLE SUN-PHILLPS-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED FAILING 2500, 6 3/4" diamond bit, rotory/air
LOGGED BY W. R. Lund

P. 76

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
cont 1176-1179						w/ a thin tuffstringer, bedding plane	
						faces are irregular.	
						1178'3' -1178'6" Bitumenous shale & TUFF;	
						blk N-1 to lt. brn. 5YR 5/6, noncalc. to	
						slt. calc., v. thinly bedded w/compaction	
						structures, hard, parting plane at	
						1178'-6"	
						1178'6"-1179' TUFF-TUFFACEOUS SILTSTONE;	
						pale brn. 5YR 5/2 to grayish orange pink	
						5YR 7/2, +95% grains silt size or below,	
						mod. to good sorting, calcareous, v. thinly	
						bedded, mod. hard to hard, nonfractured,	
						horizontal parting plane at 1178'9",	
						nonfossiliferous	
1179-1182'		BOX 370	3" DIA CORE	100%	100%	1179'-1180' TUFF-TUFFACEOUS SILTSTONE;	
						similar to above, lower 4" begin to	
						pick up thinshale interbeds	
						1180'-1182' SHALE-CLAYSTONE; med. dk. gray	
						N-4, 99% grains silt or below (probably clay)	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15

BORING NO. P-1

DATE 10/9/74 TITLE SUN-PHILLPS-SOHIO

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED FAILING 2500, 6 3/4" diamond bit, rotory/air

LOGGED BY W.R. Lund

P-77

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
cont 1179-1182						noncalc to slt. calc., thinly bedded, nonfractured, nonfossiliferous, one core 3' long, face on lower break shows v. fine grained disseminated pyrite; V. smooth surfaces on mechanical breaks	
82'-1185		BOX 371	3" DIA CORE	100%	100%	SHALE-CLAYSTONE; med. dk. gray N-4, v. similar to 1180-1182 above; parting plane at 1184; horizontal w/ hackly fracture some white coatings (unknown type-zeolite?), fine pyrite common.	
1185-1188		BOX 372	3" DIA CORE	100%	100%	SHALE-CLAYSTONE; med. dk. gray N-4, v. similar to rock directly above; 3/4" tuff horizon - grayish orange 10YR 7/4, slt. calc., mod. hard at 1186'6", bottom of core bounded by a horizontal natural parting plane core in one piece	
1188-1191		BOX 373	3" DIA CORE	192%	100%	1188-1188'3' FELDSPATHIC QUARTZ WACKE; dk. gray N-3 to grayish blk N-2, fine to	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068-15

BORING NO. P-1

DATE 10/9/74 TITLE SUN-PHILLPS-SOHIO

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED FAILING 2500, 6¾ diamond bit, rotory/air

LOGGED BY W. R. Lund

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
cont. 1188-1191						med, subrounded to rounded, qtz grains	
						with 5-10% fine grained subangular	
						feldspar, v. fine grained dk. mineral	
						indeterminant, $CaCO_3$ cement (v. calc)	
						thick bedded, porous, 710% siltsize,	
						soft to mod. hard - can rub sand grains	
						lose w/fingers, nonfossiliferous, irregular	
						horizontal parting at lower contact	
						1188'3'-1191' SHALE-CLAYSTONE; med. dk.	
						gray N-4, +95% silt or below (probably	
						clay), noncalc., v. thinly bedded, hard,	
						nonfractured, horizontal parting	
						plane at 1190'; diseminated pyrite	
						common	
1191'-1194'		Box 374	3" DIA CORE	100%	100%	1191'-1193'1' SHALE-CLAYSTONE; med. dk.	
						gray N-4 to grayish blk N-2, v. similar	
						to rock directly above, horizontal	
						parting plane at 1192'4"	
						1193'1"-1193'9' INTERBEDDED SHALE AND TUFF;	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. P-1
DATE 10/9/74 TITLE SUN-Phill/25 - SOHIO
ELEVATION ____ DATUM ____
START ____ COMPLETE ____
WATER LEVEL ____ AFTER ____
EQUIPMENT USED FAILING 2500, 6 3/4" diamond bit, rotory/air
LOGGED BY W.R. LUND

P. 78

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
CONT. 1191-1194						med. dk. gray N-4 to grayish orange	
						10YR 7/4, noncalc. (shale) to slt. calc.	
						(tuff), mod. hard to hard, nonfrac,	
						nonfossiliferous, horizontal parting plane	1193'4"
						1193'9 - 1194 SHALE-CLAYSTONE; v.	
						dusky red 10R 2/2, v. similar to rock	
						at beginning of interval, nonfractured	
1194'-1197		Box 315	3" DIA CORE	92%	100%	1194'-1194'6" SHALE-CLAYSTONE; med.	
						dk. gray N-4 to v. dusky red 10R 2/2, v.	
						similar to above	
						1194'6"-1197' TUFF; pinkish gray 5YR 8/1	
						to grayish orange 10YR 7/4, ash to	
						lapelli size, subang. to subrounded,	
						poorly sorted, calcareous, thin to	
						med. bedded, bedding locally contorted,	
						soft to mod. hard, horizontal parting	
						plane at 1194'11', fracture at 20° at	
						1195'7", frac. faces show abundandant	
						devitrified pumice lumbs, occ. mica	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15 BORING NO. P-1

DATE 10/19/74 TITLE SON-Phillps-SOHIO ELEVATION ____ DATUM ____

START ____ COMPLETE ____ WATER LEVEL ____ AFTER ____

EQUIPMENT USED FAILING 2500, 6 3/4" diamond bit, rotory/air LOGGED BY W.R.Lund

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
cont. 1194-1197						lower 2" v. hard-silica cemented.	
1197'-1200'		BOX 376	3" DIA CORE	100%	100%	1197' - 1197'10' SHALE-CLAYSTONE; med. dk.	
						gray N-4, noncalc to slt. calc., v. thinly	
						bedded, hard, nonfractured, irregular	
						bedding at lower contact	
						1197'10" - 1199' TUFF - TUFFACEOUS SILT-	
						STONE, grayish orange pink 5YR 7/2, silt	
						sized grains, mod. sorted, slt. to mod.	
						calc., thin to med. bedding, hard, horizontal	
						parting plane at 1198'	
						1199-1200' Interfingered Bituminous	
						shale and TUFFS; brnish blk. 5YR 2/1	
						(shale) to grayish orange 10YR 7/4, non-	
						calc. to slt. calc., v. thinly bedded,	
						hard, nonfrac, shale appears quite rich	
1200'-1203'		BOX 377	3" DIA CORE	81%	100%	1200'-1201'1" Interfingered Bituminous	
						Shale & Tuffs; brnish blk. 5YR 2/1 (shale)	
						to grayish orange 10YR 7/4 (tuff) similar to above	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068-15 BORING NO. P-1

DATE 10/9/74 TITLE Sun-Phillps-SOHIO ELEVATION ______ DATUM ______

START ______ COMPLETE ______ WATER LEVEL ______ AFTER ______

EQUIPMENT USED FAILING 2500, 6 3/4" diamond bit, rotory/air LOGGED BY W. R. Lund

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
cont. 1200-1203						1201'1" - 1202'2" Interbedded Tuff & Marlstone; v. pale orange (tuff) to pale brn. 5YR 5/2 (marlstone), v. calc., thin to med. bedding, bedding often contorted, mod. hard, horizontal parting planes at 1201'8" and 1202'2".	
						1202'2" - 1203 shale - siltstone; mod. yellowish brn. 10YR 5/4 to mod. brn. 5YR 3/4, noncalc. v. thinly bedded, hard, parting plane at 1202'9", top this horizon marked by a 1" blk. zone	
1203' - 1206'		BOX 378	3" DIA CORE	86%	100%	1203' - 1205'4" shale - siltstone; grayish red 5R 4/2, noncalc, v. thinly bedded, hard, nonfractured, nonfossiliferous	
						1205'4" - 1206' TUFF; grayish orange pink 10R 8/2, ash to lapalli, size, subang to subrounded, poorly sorted, v. calc, thin to thickly bedded, soft to mod. hard, horizontal parting planes at 1204'6", 1205'5" 1205'9', 1205'10".	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068-15

BORING NO. P-1

DATE 10/9/74 TITLE SUN-Phillps-SONIO

ELEVATION _____ DATUM _____

START _____ COMPLETE _____

WATER LEVEL _____ AFTER _____

EQUIPMENT USED FAILING 2500, 6 3/4 diamond bit, rotory/air

LOGGED BY WRC

81

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						parting surfaces show many devitrified	
						pumice lumbs, nonfossiliferous.	
1206'-1209'		Box 379	3" DIA CORE	100%		1206-1208'9" Tuff - Tuffaceous Siltstone;	
						v. pale orange 10YR 8/2 to yellowish gray	
						5Y 7/2, v. similar to the tuff directly above,	
						horizontal parting planes at 1206'8.5", 1206'	
						11½", 1208'4". 1208'9" - 1209 - Shale - see below	
1209-1212		Box 380	3" DIA CORE	80½%	100%	1209'-1210'8" Shale; lt. olive gray 5Y 5/2 to blk N-1,	
						slt. calc., v. thinly bedded, hard, horizontal	
						parting planes at 1209' 5½" & 1210' 5-½"	
						1210'8" - 1212' Tuffaceous Siltstone; grayish	
						yellow 5Y 8/4 to yellowish gray 5Y 7/2, grains	
						predom. silt size - occ. horizons have devit.	
						pumice lumps, poor to med. sorting, v. calc.	
						thinly bedded, soft to med. hard - some	
						rubble zones, locally friable, nonfossiliferous.	
1212-1215		BOX 381	3" DIA CORE	80½%	100%	Tuffaceous Siltstone; similar to above	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. ____________ BORING NO. ____________

DATE ________ TITLE ____________ ELEVATION ________ DATUM ________

START ________ COMPLETE ________ WATER LEVEL ________ AFTER ________

EQUIPMENT USED ____________ LOGGED BY ____________

82

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						horizontal parting planes at 1212'2",	
						1212'4", 1213'5", 1214'6", 1214'10"	
		BOX	3"DIA				
1215 -		382	CORE	75%	100%	1215 - 1216 Tuffaceous Siltstone; similar	
1220		383				to above, parting planes located at	
						1216.	
						1216' - 1216'8" SHALE-SILTSTONE; grayish	
						brown 5YR3/2, slt. calc., v. thinly bedded,	
						hard, parting planes at 1216'2"	
						1216'8" - 1218 Tuffaceous Siltstone; grayish	
						yellow 5Y 8/4, predominantly silt w/ occ.	
						horizons containing pumice lumps, poor to	
						mod. sorted, v. calc., thinly to med.	
						bedding, soft to hard, parting planes	
						at 1217'3", 1217'4", 1217'7", 1217'11"	
						nonfossiliferous	
1220' -		384		100	100	Shale: Grayish brown 5YR 3/2	
1223'6"						hand, thinly bedded, highly	
						calcareous, non-fossiliferous	
						some interbedded tuffs	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. ______ BORING NO. P-1 Core

DATE 10/9/74 TITLE ______ ELEVATION ______ DATUM ______

START ______ COMPLETE ______ WATER LEVEL ______ AFTER ______

EQUIPMENT USED L-W Air Rotary Failing 2500 LOGGED BY M. Siembieda

83

DEPTH	SAMPLES			RQD Blows or Force		DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type		Recovery, Condition		
1220 - 1223'6" cont			~~384~~			parting plane at 1221'2"	
1223'6"		385	~~385~~	97	100	Tuff, very pale orange (10YR 8/2)	
1226						soft to moderatley hard,	
						fine to ~~coars~~ medion grain (some	
						pumice?) moderate sorting	
						generally massive, highly	
						calcareous, non-fossiliferous	
						non-fractured	
1226-				80	100	shale (Mudstone) Pale yellowish	
1238						brown (10 YR 6/2) to dusky	
						yellowish brown (10 YR 2/2)	
						olive black (5Y 2/1), moderatley	
						calcareous hard, thinly bedded	
						non-fossiliferous, some	
						interbedded tuffs at top	
						of Zone. fractures	
						1131'3 to 1233'2", Rubble	
						and 1238'6" to 1239' Rubble	

NOTES:

FUGRO

7-23-73 L-013

BORING NO. P-2 Pilot Hole

FIELD LOG OF BORING

PROJECT NO. 74-062-15
DATE 9/24/74 TITLE SUN PHILIPS
START ____ COMPLETE ____
EQUIPMENT USED FAILING 2500

BORING NO. P-2 - PILOT HOLE
ELEVATION ____ DATUM ____
WATER LEVEL ____ AFTER ____
LOGGED BY C. ROMAN

PAGE 1

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
0-5			Rotary			Silty SAND (SM) lt. GRAY BROWN	
						DRY, loose, VF-F SAND, MODERATELY	
						SORTED, MOSTLY UNCONSOLIDATED,	
						BUT SOME MODERATELY CALCAREOUS	
						(VERY REACTIVE) CEMENT	
5-10			"			SAME AS ABOVE	
10-15			"			INTERBEDDED, SAND lt GRAY BROWN	
						AND SILT, lt GRAY BROWN POORLY	
						INDURATED, VERY REACTIVE,	
						MINOR AMOUNTS OF Silty SAND	
15-20			"			Same EXCEPT SAND IS VERY POORLY	
						INDURATED TO UNCONSOLIDATED	
20-25			"			Same EXCEPT COLOR BECOMING MORE	
						YELLOWISH SILT MORE INDURATED	
						CALCAREOUS OCC. CALICHE FRAGMENT	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15
DATE 9/14/74 TITLE
START COMPLETE
EQUIPMENT USED FAILING 2500

BORING NO. P-2 · PILOT HOLE
ELEVATION DATUM
WATER LEVEL AFTER
LOGGED BY C. ROMAN

PAGE 2

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
25-30			Rotary			Same	
30-35			"			SANDSTONE, YELLOW BROWN (OXIDIZED)	
						VF-M, MODERATELY SORTED	
						MODERATELY CALCAREOUS W/ MINOR	
						SILTSTONE, YELLOW BROWN, MOD.-	
						HIGHLY CALCAREOUS W/ CALICHE (WHITE)	
						FRAGMENTS	
35-40			"			SAME, LESS SILTSTONE	
40-45						SANDSTONE, YELLOW BROWN	
						F-M, MOD.-WELL SORTED SUBANGULAR	
						MOD. CALCAREOUS, OCC. BLACK	
						LAMINATIONS. 10-15% DARK MINERALS	
45-50			"			SAME EXCEPT OCC. F.	
						YELLOW BROWN SANDSTONE	
						MOD. CALCAREOUS, OCC. GRAY	
						(FRESH) SANDSTONE FRAGMENTS	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068-15
DATE 9/24/74 TITLE
START COMPLETE
EQUIPMENT USED FAILING 2500

BORING NO. P-2 - PILOT HOLE
ELEVATION DATUM
WATER LEVEL AFTER
LOGGED BY C. Roman

PAGE 3

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
50-55			Rotary			SANDSTONE, GREY, F-M,	
						WELL SORTED, SUBANGULAR, SLIGHTLY	
						MOD. CALCAREOUS, 10-15%	
						DARK MINERALS	
[illegible]5-60			"			SAME	
9/28/74							
60-70			"			SAME AS ABOVE W/ BROWN & TAN	
						SANDSTONE	
70-75			"			SAME AS ABOVE	30FT/HR
75-80						SAME AS ABOVE 20FT/HR.	BIG CHATTER
80-85			"			SAME AS ABOVE EXCEPT TAN S.S. DECREASING	
[illegible]-90			"			SAME as above	

NOTES: HOLE CAVING TRY 24" BUCKET AUGER W/ 20" CSGS.

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. P-2-PILOT HOLE
DATE 9/13/74 TITLE SUN-PHILIPS
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED FAILING 2500
LOGGED BY C. ROMAN

PAGE 1 of ___

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
90-95			Rotary			Silty SANDSTONE, GRAY, SL. WEATHERED, MOD. HARD - SOFT, W/FINE SAND, MICA FLAKES AND BIOTITE CUTTINGS ANGULAR-SUBROUNDED, CALCAREOUS, SIZE C.SAND - F.GRAVEL	START 2:20 AM
95-100			"			SAME AS ABOVE - FEW PIECES OF TAN-BROWN Silty SANDSTONE	
100-105			"			SAME AS ABOVE - CUTTINGS SLIGHTLY WEATHERED, SOFT-MOD HARD. SIZE M.SAND - C.GRAVEL	
105-110			"			SAME AS 90-95. CUTTINGS BECOMING MORE PLATY	
110-115			"			Silty SANDSTONE, GRAY, SL. WEATHERED, MOD. HARD, SUBANGULAR, W/FINE SAND, MICA FLAKES, BIOTITE. SIZE OF CUTTING - M.SAND - F.GRAVEL	112-115 RIG CHATTER

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. P-2- PILOT HOLE
DATE 9/13/74 TITLE SUN-PHILIPS
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED FAILING 2500
LOGGED BY C. ROMAN
pp 7 of ___

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
115-120			Rotary			Silty SANDSTONE, gray, HARD	115-120 RIG CHATTER
						CALCAREOUS, w/ FINE SAND	
						BIOTITE,	
						ALSO Silty Clay (CL) olive (5Y 5/4)	
						HARD NON PL., calcareous	
						AMOUNT OF BROWN-TAN	
						SANDSTONE INCREASING	
120-125			"			Silty Sandstone, gray,	
						mod. hard, abnt qtz,	
						fine to med gr.	
						occassional mafics	
125-130			"			Silty SANDstone - same	15 FT/HR.
						as above but with	
						occassional chips of	
						lt. brown Sandstone, med	
						gr.	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 79-068-15

BORING NO. P-2 - Pilot hole

DATE 9/13/79 TITLE Sun-Phillips

ELEVATION _____ DATUM _____

START _____ COMPLETE _____

WATER LEVEL _____ AFTER _____

EQUIPMENT USED Failing 2500
Schicke

LOGGED BY D Westcott
pp 3 of —

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
130-135						Sandstone: silty grey qtz, fine to med gr. mod hard to Soft., occassional mafics present	20 ft/hr
135-140						Sandstone: Same as above	18 ft/hr.
140-145						Sandstone; same as above, but mod hard to hard	22 ft/hr.
145-150						Sandstone: silty, VFG. grey soft to mod hard, & siltstone pale green Soft to mod hard	20 ft/hr
150-155						Sandstone & Siltstone same as above	20 ft/hr.

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74068-18
DATE 9/13/74 TITLE San Phillips
START ________ COMPLETE ________
EQUIPMENT USED Failing 2500
Schocke

BORING NO. D-2 Pilot hole
ELEVATION ________ DATUM ________
WATER LEVEL ________ AFTER ________
LOGGED BY D. Westcott
pp 9 of —

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
155-160						Sandstone: same as above but mod. hard to hard	12 ft/hr.
160-165						Sandstone: gray w/ some carbonaceous material med gr, mod hard siltstone, lt. green-brn, moderately hard	7 ft/hr.
165-170						Sandstone & siltstone same as above	10 ft/hr.
170-175						Sandstone & siltstone same as above	10 ft/hr.
175-180						Sandstone & siltstone same as above	15 ft/hr.

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15
DATE 9/13/74 TITLE Sun Phillips
START ______ COMPLETE ______
EQUIPMENT USED Failing 2500

BORING NO. P-2 Pilot hole
ELEVATION ______ DATUM ______
WATER LEVEL ______ AFTER ______
LOGGED BY DaVett

pp 5 of ___

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
180-185						Siltstone: same as before but with occassional chips of sandstone	15 ft/hr 15 ft/hr
85-190						Siltstone: same as above but ~~becoming~~ more platy	
190-195						Siltstone - same as above	15 ft/hr
195-200						Siltstone same as above	
200-205						Siltstone - same as above	13 ft/hr
205-210						Siltstone - as above becoming more platy w/ chips of shiny mineral (arsenopyrite?)	10 ft/hr

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-069.15

DATE ______ TITLE San Phillips

START ______ COMPLETE ______

EQUIPMENT USED Failing 2500

BORING NO. P-2

ELEVATION ______ DATUM ______

WATER LEVEL ______ AFTER ______

LOGGED BY A Westcott

pp 6 of —

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
210-215						Siltstone, green-grey	20ft/
						soft to mod. hard	/hr
						abundant (around pyrite)	
						somewhat platy	
215-220						Siltstone as above	20 ft/
						but pyrite less	/hr.
						abundant	
220-225						Siltstone as above but	
						with lt. brown platy	
						siltstone, abundant pyrite	
225-230						As above	20ft/
							/hr
230-235						As above but only	18ft/
						occassional pyrite	/hr.
235-240						same as above	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. P-2- PILOT HOLE
DATE 6/13/74 TITLE SUN PHILIPS
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED FAILING 2500
LOGGED BY C. ROMAN

pp 7 of ___

DEPTH	SAMPLES					DESCRIPTION	REMARKS	
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:		
240-245			Rotary			Siltstone, gray-lt. gray	244-245 RIG CHATTER	
						SOFT-MOD. HARD, VERY PLATY	10 FT/HR	
						CUTTINGS < 1/2", HIGHLY CALCAREOUS		9:10
245-250			"			SAME AS ABOVE	OCC. RIG CHATTER	
							245-250	
250-255			"			Siltstone SL-MOD CALCAREOUS	RIG CHATTER 250-255	3'/3½
255-260			"			Siltstone, MOD-HARD - HARD	RIG CHATTER 255-260	
						MOD. CALC.		
260-265			"			SILTSTONE, SAME AS above, SL. CALC.		
265-270			"			Siltstone - SAME AS above, SL-MOD CALC		10:05
270-275						Siltstone. SAME AS ABOVE	.17 FT/MIN	
						CUTTINGS INCREASING IN SIZE (< 1/2")		
						SL. CALC		

NOTES: START 8:00 PM

DRILLERS COMMENT: SMALL INCREASE IN RETURN WATER AT 273' (APPR.-?)

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068-15

BORING NO. P-2- PILOT HOLE

DATE 9/13 TITLE SUN - PHILIPS

ELEVATION _____ DATUM _____

START _____ COMPLETE _____

WATER LEVEL _____ AFTER _____

EQUIPMENT USED FAILING 2500

LOGGED BY C. Roman

pp 8 of ___

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
275-280			Rotary			SILTSTONE, BROWN- DARK BROWN	275-280 RIG CHATTER
						MOD. HARD - HARD, PLATY BUT	
						INCREASING IN THICKNESS, SL. CALCAREOUS	
						ALSO SILTY CLAY (CL) OLIVE (5Y 5/4)	
						HARD, CALCAREOUS	
280-285			"			SAME AS ABOVE EXCEPT NO	280-283 LOUD RIG
						SILTY CLAY	CHATTER 283-285 OCC.
							chatter
285-290			"			SILTSTONE	OCC RIG CHATTER 285-290
							.5'/MIN
290-295			"			SILTSTONE	
295-300			"			SILTSTONE, LT. BROWNISH GRAY,	
						MOD HARD PLATY, MOD-HIGHLY	
						CALC. - W/ PRESENT OF AN UNKNOWN	
						SHINY MINERAL	

NOTES: 295- MAKING WATER

12:00PM - WATER 7.5 GAL/MIN

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. P-2-PILOT HOLE
DATE 9/14/74 TITLE SUN-PHILIPS
ELEVATION ________ DATUM ________
START ________ COMPLETE ________
WATER LEVEL ________ AFTER ________
EQUIPMENT USED FAILING 2500
LOGGED BY C. Reman

pp 9 of —

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
300-305			Rotary			Siltstone, grayish brown, platy	.3'/MIN
						PALE BROWN, MOD. HARD, MOD.	
						CALCAREOUS, CUTTINGS < 1/4"	
305-310			"			Same as above	15 gal/Min
							RIG CHATTER .17'/MIN
310-315			"			Same as above - CUTTINGS	CONSTANT RIG CHATTER
						INCREASED SLIGHTLY IN SIZE V PLATY	.17'/MIN
315-320			"			SAME AS ABOVE EXCEPT	CONSTANT RIG CHATTER
						Silty Clay (CL) olive (5Y 5/4)	.25'/MIN
						HARD NONCALCAREOUS	15 gal/MIN
320-325			"			SAME EXCEPT [illegible] DARK GRAY	5YR 4/1
						V. PLATY, NO Silty Clay	
325-330			"			Siltstone; [illegible] DARK GRAY	5YR 4/1
						MOD HARD MOD CALC. CUTTING < 1/4"	.11'/MIN
						Silty Clay (CL) Olive (5Y 5/4) HARD	

NONCALC

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. F-2- PILOT HOLE
DATE 9/14/74 TITLE SUN PHILIPS
ELEVATION ________ DATUM ________
START ________ COMPLETE ________
WATER LEVEL ________ AFTER ________
EQUIPMENT USED FAILING 2500
LOGGED BY C. [illegible]

pp 10 of _

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
330-335			Rotary			Siltstone dark gray	15 gal/MIN
						5YR 4/1) mod hard mod calcareous	
						v. platy cuttings <½")	
						Silty Clay (CL) olive (5Y 5/4)	
						hard noncalc.,	
335-340			"			Same as above	occ RIG CHATTER
340-345			"			Same as above	15 gal/MIN
345-350			"			SAME AS ABOVE	11'/MIN
350-355			"			SAME AS ABOVE	15 gal/MIN
355-360						Same AS ABOVE	11'/MIN
360-365						Same as above	15 gal/MIN 7:00

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15
DATE 9/14/74 TITLE SUN-PHILIPS
START ______ COMPLETE ______
EQUIPMENT USED FAILING 2500

BORING NO. P-2- PILOT HOLE
ELEVATION ______ DATUM ______
WATER LEVEL ______ AFTER ______
LOGGED BY C. Roman

pp 1 of ___

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
365-370			Rotary			Siltstone [illegible] DARK GRAY	
						5YR 4/1, MOD HARD MOD CALC.	
						V. PLATY, CUTTINGS < 1/2"	
						AMOUNT OF Silty Clay DECREASING	
370-375						Siltstone - dark redish grey	
						mod hard, mod calc.	
						platy.	
9:25						Rig shuts down - Air	
to 7:30						compressors are	
						out of fuel	
375-385						No samples	
385-390						Siltstone - As Above	
390-395						Siltstone - grey to dk.	
						grey, very platy, mod	
						hard.	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15
DATE 9/14/74 TITLE San Philips
START ________ COMPLETE ________
EQUIPMENT USED FAILING 2500

BORING NO. P-2-PILOT HOLE
ELEVATION ________ DATUM ________
WATER LEVEL ________ AFTER ________
LOGGED BY C. Roman

pp 12 of —

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
395-400			Rotary			SiltSTONE, VERY DARK GRAY, 5Y/2	3/1
						MOD. HARD, V. PLATY, MOD-HIGHLY	
						CalCAREOUS CUTTINGS < 1/2"	
						Silty, Clay, (CL) OLIVE (5Y 5/3)	
						V. HARD, NONCALC.	
400-405			"			Same as above	.17'/MIN
405-410			"			Same as above except NO	405 RIG CHATTER
						Silty Clay, CUTTING LARGER (< 1 1/2")	
						Making WATER.	
410-415			"			SAME AS ABOVE WITH	410 RIG Chatter
						SILTSTONE TAN, SOFT-MOD HARD	ALSO at 412
						HIGHLY, CALC.	
415-420			"			Same as above	416 Rig Chatter
							AT 418
							.1'/MIN

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. P-2-PILOT HOLE
DATE 9/14/74 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED FAILING 2500
LOGGED BY C. ROMAN

pp 13 of

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
420-425			Rotary			SILTSTONE, DARK GRAY 5YR 4/1	420 Rig chatter
			/			MOD HARD, MOD CALCAREOUS,	423-424
						PLATY, CUTTINGS < 1/2"	
425-430			"			Same as above	Rig CHATTER 425-426
							429-430
430-435			"			Same w/ SILTSTONE TAN	
						MOD HARD MOD CALCAREOUS	
435-440			"			SILTSTONE, DARK GRAY (5YR 4/1)	Constant Rig CHATTER
						MOD HARD, MOD Calc platy	.17'/(MIN) +
						CUTTING < 1/2"	
440-445			"			SAME AS ABOVE	
445-450			"			Same as above	Rig Chatter All

NOTES: DRILLERS COMMENT: AT 438 - MORE [illegible]

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-086 EG
BORING NO. P-2 - PILOT HOLE
DATE 9/19/74 TITLE SUN - PHILIPS
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED FAILING 2500
LOGGED BY C. Roma

pp 19 of —

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
0-92						CEMENT	
92-363						GRAVEL, MAKING WATER	
363-436						CLEAR OF GRAVEL	
436-450						GRAVEL	
450-455						SILTSTONE, DARK GRAYISH BROWN, 10YR 4/2	
						HARD, MOD CALCAREOUS	
						PLATY, CUTTINGS < 1/2")	
						ALSO INCLUDE IS GRAVEL	
						THAT WAS NOT BLOWN OUT OF HOLE	
455-460			Rotary			SAME AS ABOVE NO GRAVEL	RIG CHATTER
						Except finely laminated, w/ small	
						inclusions	
460-465						Same Siltstone	

NOTES:

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. Pilot Hole -2
DATE 9-20 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED Failing 2500 Schocke
LOGGED BY D Westcott

pp 15 of —

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
465-470						Siltstone: Dark grey, hard, platy, occassional flake of mica along parting surfaces	
470-475						Siltstone: As above but slightly reddish	
475-480						Siltstone: light brown-tan hard, platy, similar to above	
480-485						Siltstone: similar to above	
485-49						Siltstone: Brown, mod hard to hard, very platy	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15

BORING NO. Pilot Hole - 2

DATE ______ TITLE ______

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED Failing 2500
Schoake

LOGGED BY D. Wasteast

pp 16 of ___

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
490-495						Siltstone: similar to above but occassional flakes of mica along parting surfaces very thinly laminated	
495-500						Siltstone: Red brown mod hard, very platy mottled light tan	
500-505						Siltstone: similar to above but occassional flakes of mica along parting surfaces	
505-510						Siltstone: dk. Mahogany brown, hard to very hard, platy	very slow drilling frequent rig chatter

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15
DATE 9/20/74 TITLE SUN PHILIPS
START ______ COMPLETE ______
EQUIPMENT USED FAILING 2500

BORING NO. P-2-PILOT HOLE
ELEVATION ______ DATUM ______
WATER LEVEL ______ AFTER ______
LOGGED BY C. Roman

pp 17 of —

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
510-515						Siltstone; siltstone	very
						similar to above	slow
							drilling
							freq.
							chatter
515-520			Rotary			SILTSTONE, DARK GRAY 10YR 4/1,	SLOW DRILLING OCC. RIG CHATTER
						MOD. HARD., SLIGHTLY CALCAREOUS,	5FT./HR.
						PLATY w/ OCC. PIECE THAT ARE NON PLATY	
						THINLY LAMINATED w/ SPECKS / INCLUSION	
						OF RED MINERAL(?), ALSO STREAKS ON	
						UNKNOWN BLACK MATERIAL	
						CUTTING <1"	
						SILTSTONE, PALE BROWN, 10 YR 6/3,	
						SOFT-MOD. HARD, MOD-HIGHLY CALCAREOUS	
						OCC. MICA FLAKES, CUTTING <1/8"	
520-525			"			SAME AS ABOVE, CUTTING <1/2"	5FT/HR
525-530			"			SAME AS ABOVE EXCEPT NO PALE	5FT/HR
						BROWN SILTSTON CUTTIN <1/2	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15
DATE 9/20/74 TITLE SUN PHILIPS
START ____ COMPLETE ____
EQUIPMENT USED FAILING

BORING NO. P-2- PILOT HOLE
ELEVATION ____ DATUM ____
WATER LEVEL ____ AFTER ____
LOGGED BY C ROMAN

pp 18 of __

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
530-535			Rotary			SILTSTONE, DARK GRAY 10YR 4/1	5FT/HR.
						HARD, MOD-HIGHLY CALCAREOUS, PLATY	
						THINLY LAMINATED, CUTTING < 1/2"	
						ALSO PALE BROWN SILTSTONE	
						(CUTTING < 1/3")	
535 540			"			Same AS ABOVE WITH	
						Silty Clay (CL) OLIVE, HARD,	
						NONcalcareous	
540-545			"			Same as above No silty clay,	10FT/HR
						W/ WHITE SILTSTONE, HARD, HIGHLY	
						CALCAREOUS, PLATY	
545-550			"			Same as 530-535 INTERVAL	10FT/HR.

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. P-2 Pilot HoLE
DATE 9/20/74 TITLE SUN PHillips
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL 145′ AFTER ______
EQUIPMENT USED FAILING
LOGGED BY M. TURNER

pg 19 of __

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
550-555			Rotary			SILTSTONE, DARK GREY, 10 YR 4/1	10/FT/HR
						HARD, SLIGHTLY MICACEOUS,	
						CALCAREOUS, THINLY	
						LAMINATED	
			"				
555-560						SILTSTONE, DARK GREY BROWN,	10 FT/HR
						MOD. HARD TO HARD, SLIGHTLY	
						MICACEOUS, VERY CALCAREOUS	
						THINly LAMINATED	
			"				
560-565						SILTSTONE, DARK GREY BROWN,	6 FT/HR
						HARD, SLIGHLY CALCAREOUS	
565-570			"			SILTSTONE, DARK BROWN, VERY	20 FT/HR
						HARD, CALCAREOUS	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 29-008-15
DATE 9/20/74 TITLE Sun Phillips
START ______ COMPLETE ______
EQUIPMENT USED Schock-Failing 2500
BORING NO. Pilot Hole 2
ELEVATION ______ DATUM ______
WATER LEVEL 145' AFTER ______
LOGGED BY D. Westcott
pp 20 of ___

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
570-575			Rotary			Siltstone: dark grey-brown hard, platy, very slightly calcareous	
575-580			"			Siltstone - similar to above but mod. calcareous	
580-585			"			Siltstone & sandstone siltstone: dark greenish grey, hard, platy sl. calcareous, micacious sandstone: dark greenish grey, silty, fine grained, soft to mod. hard non-calcareous	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 79-068-15

BORING NO. Pilot Hole 2

DATE ______ TITLE Sons Phillips

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED Schocko Air Rotary
Failing 2500

LOGGED BY O. Westcott

pp 21 of ___

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
585-590			Rotary			Siltstone: greenish brown hard, platy, moderately calcareous	
590-595			"			Siltstone: similar to above	
595-600			"			Siltstone: greenish brown hard platy very slightly calcareous	
600-605			"			Siltstone: greenish to brown, hard, platy mod. calcareous	
605-610			"			Siltstone: as above	
610-615			"			Siltstone: " "	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068-15 BORING NO. Pilot Hole 2

DATE ______ TITLE Son Phillips ELEVATION ______ DATUM ______

START ______ COMPLETE ______ WATER LEVEL ______ AFTER ______

EQUIPMENT USED Schocke Ar. Rotary
Failing 2500

LOGGED BY D. Westcott

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
615-620			Rotary			Siltstone: greenish brown hard, platy, mod calcareous	
620-625			"			Siltstone: As above, micaceous	
625-630			"			Siltstone: As above	
630-635						Siltstone: As above	
635-640						Siltstone: " " but w/ abnt. mica.	
640-645						Siltstone: As above	
645-650						Siltstone: As above	
651						CRACKS APPEAR AROUND Rig. Shut Rig down	

NOTES:

FUGRO

7-23-73 L-C.

FIELD LOG OF BORING

PROJECT NO. 79-068-15
BORING NO. P-2 PILOT
DATE 10/9 TITLE Sun Phillips
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED Schocke Failing
LOGGED BY D. Westcott
P18

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
655						Siltstone - same as above but decrease in Mica	18/HR
660						Siltstone - same as above	30/HR
665						Siltstone - same as above	25/HR
670						Siltston - same as above	30/HR
675						Siltstone - same as above	33/HR
680						Siltstone - same as above	30/HR
685						Siltstone - same as above	30/HR
690						Siltstone - same as above	30/HR

NOTES:

Fugro

FIELD LOG OF BORING

PROJECT NO. 74 OC8 15
DATE 10-5-74 TITLE
START ~~[illegible]~~ 2400 COMPLETE
EQUIPMENT USED [illegible]- FAILING

BORING NO. P2 PILOT
ELEVATION DATUM
WATER LEVEL AFTER
LOGGED BY Al Milliken
P19

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition; grain-size distribution, bedding, geologic details:	
690-695						SILTSTONE, DARK GRAY, SLIGHTLY	
						CALCAREOUS, VERY STRONG KEROGEN	
						ODOR	
695-700						SAME PETROLITHIC SILTSTONE AS ABOVE	
700-705						SAME AS ABOVE	
705-710						SAME PETROLITHIC SILTSTONE AS ABOVE	
710-715						SAME AS ABOVE	
715-720						SAME PETROLITHIC SILTSTONE AS ABOVE	
720-725						SAME PETROLITHIC SILTSTONE AS	
						ABOVE WITH MINOR LT BROWN SILTSTONE	
725-730						SAME AS ABOVE	
730-735						SAME PETROLITHIC SILTSTONE AS ABOVE	
735-740						SAME PETROLITHIC SILTSTONE AS	
						ABOVE WITH MINOR LT BROWN SILTSTONE	
740-745						PETROLITHIC SILTSTONE AS ABOVE WITH	
						INCREASING % LT BROWN SILTSTONE	
745-750						SAME AS ABOVE	
750-755						SILTSTONE LT.-DK BROWN,	
						DK GRAY, SLIGHTLY CALCAREOUS,	
						DK GRAY IS PETROLITHIC	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74 068 15
BORING NO. P2 PILOT
DATE 10-5 TITLE
ELEVATION DATUM
START 0410 COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED SCHOCKE-FAILING
LOGGED BY M MILLIKEN

P20

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
755-760						SILTSTONE, LT TO DK BROWN,	
						DK GRAY. SLIGHTLY CALCAREOUS.	
						DK GRAY IS PETROLITHIC	
760-765						SAME AS ABOVE	
765-770						SAME AS ABOVE 50/50% LT-BROWN/DK GRAY	
770-775						SAME MIXTURE AS ABOVE	
775-780						SAME AS ABOVE	
780-785						SILTSTONE, CHIEFLY LIGHT	
						BROWN, SOME DK BROWN-GRAY	
						SILTSTONE, SLIGHTLY CALC, SLIGHTLY PETRO-	
						LITHIC	
785-790						SAME AS ABOVE 50/50% LT BROWN/DK GRAY-BROWN	
790-795						SILTSTONE, LT BROWN, LT GRAY TO	
						DARK GRAY, SLIGHTLY CALC, PETROLITHIC	
795-800						SILTSTONE LIGHT TO DARK BROWN,	
						SOME DARK GRAY. CALCAREOUS PETROLITHIC.	
800-805						SAME AS ABOVE, 50/50 MIXTURE OF	
						BROWN/DARK GRAY. PETROLITHIC	
805-810						SAME AS ABOVE - CONTINUED	
						STRONG KEROGEN ODOR	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74 068 15
BORING NO. P2 PILOT
DATE 10-5 TITLE
ELEVATION DATUM
START 0745 COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED SCHOCKE - FAILING
LOGGED BY M MILLIKEN

P21

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
810-815						SILTSTONE, LT TO DK BROWN,	
						MINOR DK GRAY SILTSTONE,	
						SLIGHTLY PETROLITHIC (SLIGHT KEROGEN ODOR)	
815-820						SAME AS ABOVE.	
820-825						SAME AS ABOVE, WITH ~~A~~ 50%	
						DARK GRAY PETROLITHIC SILTSTONE.	
25-830						SAME AS ABOVE, STRONG KEROGEN ODOR	
830-835						CHIEFLY A DARK BROWN SILTSTONE,	
						SLIGHTLY CALCAREOUS, PETROLITHIC,	
						WITH MINOR LIGHT BROWN SILTSTONE.	
835-840						SAME AS ABOVE, INCREASING %	
						DARK GRAY SILTSTONE	
840-845						SAME SILTSTONE AS ABOVE, STRONG	
						KEROGEN ODOR	
845-850						SILTSTONE, CHIEFLY LT TO DK	BROWN,
						SLIGHTLY CALCAREOUS, KEROGEN ODOR	
850-855						SAME AS ABOVE	
855-860			SILTSTONE -			SAME VARIOUS SHADES OF BROWN	AS AB
						WITH MINOR DK GRAY SILTSTONE.	
						(PETROLITHIC)	

NOTES:

FUGRO

7-23-73 LP

FIELD LOG OF BORING

PROJECT NO. 74 068 15
BORING NO. P2 PILOT
DATE 10-5 TITLE
ELEVATION DATUM
START 1045 COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED SCHRAMM FAILING 2500
LOGGED BY M MILLIKEN

P22

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
860-865						SILTSTONE, LT TO DARK BROWN,	
						LAMINATED, SLIGHTLY CALCAREOUS	
						SLIGHT KEROGEN ODOR, LAMINATIONS	
865-870						SAME AS ABOVE	
870-875						SAME AS ABOVE	
875-880						SAME SILTSTONE AS ABOVE	
880-885						SILTSTONE, LIGHT GRAY + BROWN TO	
						DARK GRAY + BROWN, LAMINATED, SLIGHTLY	
						CALCAREOUS, KEROGEN ODOR	
885-890						SAME AS ABOVE	
890-895						SAME AS ABOVE,	
895-900						SAME SILTSTONE AS ABOVE	
905						Siltstone: mixture of ~~brown~~	25/
						10 YR 4/1 dark grey and brown	/HR
						7.5 YR 5/2, hard, ~~friable~~, Thinly	
						laminated, platy, mod. fissle,	
						sl. calcareous	
910						siltstone - same as	23/HR
						above	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. P-2 PILOT
DATE 10/5 TITLE Son Phillips
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED Schocko Failing 2500
LOGGED BY D. Westcott

P 23

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
~~915~~							
915			Rotary			Siltstone - pinkish grey	27/
						to dk. brn, Thinly laminated,	/HR
						petrolithic, mod. calc.	
						mod fissle, some organic	
920						Siltstone - same as	27/
						above	/HR
925						Siltstone - same as	37/
						above	/HR
930						Siltstone - same as	25/
						above	/HR
935						Siltstone - grey, sl. petro-	19/
						lithic, mod calc, v. hard, mod	/HR
						fissle, some organic	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 79-008-15

DATE 10-5 TITLE Sun Phillips

START ______ COMPLETE ______

EQUIPMENT USED Schacke Failing

BORING NO. P-2 PILOT

ELEVATION ______ DATUM ______

WATER LEVEL ______ AFTER ______

LOGGED BY D. Westcott

P29

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
940						Siltstone - same as before but non-calcareous, hard, thinly laminated	27/ /HR
945						Siltstone - same as above	20/ /HR
950						Siltstone - Dark grey and black to brown, sl. calcareous highly petrolithic, hard Thinly laminated	
958						Siltstone - same as above	
965						Siltstone - same as above	
970						Siltstone - same as above	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15
BORING NO. P-2 PILOT
DATE 10-5 TITLE Son Phillips
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED Schocko Failing
LOGGED BY O. Westcott
P25

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
980						Siltstone - same as above	
985						Siltstone - same as above but very slight efforuesence	
990						Siltstone: same as above but with occassional chips of sandstone; mod, friable, qtz, med grain, Yellowish brown non-calcareous	
995						Siltstone - same as above but "one clast of sandstone"	
1000						Siltstone - same as above but no sandstone	

NOTES:

FUGRO

7-23-73 L-

FIELD LOG OF BORING

PROJECT NO. 79-068-15

BORING NO. P-2 PILOT

DATE 10-5 TITLE Sun Phillips

ELEVATION ________ DATUM ________

START ________ COMPLETE ________

WATER LEVEL ________ AFTER ________

EQUIPMENT USED Schocke Failing

LOGGED BY E. Westcott

PP26

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
1005			Rotary			Siltstone - same as above	
1010			"			Siltstone - same as above	
1015			"			Siltstone - same as above but with ~~a~~ an increase in black, petrolithic chips	
1020			"			Siltstone - same as above	
1025			"			Siltstone - Grey very platy, Thinly laminated slightly petrolithic non-calc	
1030			"			Siltstone - same as above but with black petrolithic chips	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068.15
BORING NO. P-2 PILOT
DATE
TITLE Son Phillips
ELEVATION
DATUM
START
COMPLETE
WATER LEVEL
AFTER
EQUIPMENT USED Schock Failing
LOGGED BY D. Westcott
PP-27

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1035			Rotary			Siltstone - same as above	
1040			"			Siltstone - same as above but with black poteslithic chips mod. abundant	
1045			"			Siltstone - same as above but slightly harder - hard to very hard	
1055			"			Siltstone - same as above	
1060			"			Siltstone - Same as above	
1065			"			Siltstone - same as above	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068-15　　BORING NO. P-2 PILOT

DATE 10-5 TITLE Sun Phillips　　ELEVATION ______ DATUM ______

START ______ COMPLETE ______　　WATER LEVEL ______ AFTER ______

EQUIPMENT USED Schocke Failing　　LOGGED BY D. Walcott

PP 28

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1070						Siltstone - same as above	
1075						Siltstone - same as above	
1080						Siltstone - Grey to dark brown same as above	
1085						Siltstone - same as above	
1090						Siltstone - Grey same as above	
1095						Siltstone - Grey to black hard to very hard platy Thinly laminated, non calc.	

NOTES:

Fugro

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 79-068-15

BORING NO. P-2 PILOT

DATE ____ TITLE Sam Phillips

ELEVATION ____ DATUM ____

START ____ COMPLETE ____

WATER LEVEL ____ AFTER ____

EQUIPMENT USED Schocko Failing

LOGGED BY D. Westcott

pp 29

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1000						Siltstone - same as above	
1105						Siltstone - same as above but grey to dk grey to brown, non-calcareous	
1110						Siltstone - same as above but grey to dk grey to black to brown, non-calc.	
1115						Siltstone - same as above	
1120						Siltstone - same as above but sl calcareous	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068-15

DATE 10-5 TITLE

START COMPLETE

EQUIPMENT USED Schocks Failing

BORING NO. P-2 PILOT

ELEVATION DATUM

WATER LEVEL AFTER

LOGGED BY D Westcott

PP 30

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1125			Rotary			Siltstone - Same As Above	
1130			11			Siltstone - Same As Above but non-calcareous	
1135			11			Siltstone - Same As Above	
1140			11			Siltstone - Same As Above	
1145						Siltstone - Same As Above	
1150						Siltstone - Same As Above	
[illegible]						Siltstone Same As Above	

NOTES:

FUGRO

FIELD LOG OF BORING

1350
1180
1170

PROJECT NO. 74 062 15
BORING NO. P-2 PILOT
DATE 10-6 TITLE
ELEVATION DATUM
START 0800 COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED SCHELKE FRILLING
LOGGED BY M MILLIKEN
DICK WEBER
P31

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1155-1160						SILTSTONE, GRAY AND BROWN,	
~~1160-1165~~						NON CALCAREOUS, NON PETROLITHIC	
1160-1165						SAME SILTSTONE AS ABOVE	
1165-1170						SAME AS ABOVE	
1170-1175						SAME SILTSTONE AS ABOVE	
1175-1180						SILTSTONE GRAY TO BROWN,	
						LAMINATED, SLIGHTLY CALCAREOUS	
1180 1185						SAME AS ABOVE	
1185-1190						As above	
1190-95						Siltstone lt. to	
						dark gray and dark brown	
						dk brown is calc; laminated	
						slight keragen odor	
1195-1200						SAME AS ABOVE	
1200-1205						SAME AS ABOVE	
1205-1210						SAME SILTSTONE AS ABOVE BUT	
						CHIEFLY GRAY (LT TO DAR)	
1210-1215						SAME AS ABOVE	
1215-1220						As above	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74 068 15

BORING NO. P2 PILOT

DATE 10-6 TITLE

ELEVATION DATUM

START 0255 COMPLETE

WATER LEVEL AFTER

EQUIPMENT USED SCHOCKE - FAILING

LOGGED BY M MILLIKEN - D WEBER

P32

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1220-1225						SILTSTONE, LT TO DARK GRAY,	
						BROWN, LAMINATED. LIGHT	
						GRAY CONSTITUANTS ARE CALCAREOUS	
1225-1230						SAME AS ABOVE	
1230-35						AS ABOVE	
1235-1240						SAME AS ABOVE WITH AN INCREASING	
						% OF DARK CONSTITUANTS	
1240-1245						SAME AS ABOVE, DARK CONSTITUANTS	
						ARE PETROLITHIC	
1245-1250						SAME AS ABOVE CHIEFLY	
						GRAY CONSTITUANTS.	
1250-1255						SILTSTONE DARK GRAY AND BROWN	
						NONCALCAREOUS, LAMINATED,	
						KEROGEN ODOR	
1255-1260						Siltstone - Dk gray to lt.	
						brown, non calc.	
1260-65						As above - poor recovery	

NOTES:

FUGRO

7-23-73 L-0

FIELD LOG OF BORING

PROJECT NO. 74 068 15

BORING NO. P-2 PILOT

DATE 10/6 TITLE

ELEVATION

DATUM

START

COMPLETE

WATER LEVEL

AFTER

EQUIPMENT USED Schado-Failing

LOGGED BY Milliken/Weber

P 33

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1265-70						Siltstone - as above no odor	
1270-1275						SILTSTONE, LT TO DARK GRAY,	
~~[illegible]~~						BROWN, SLIGHTLY CALCAREOUS	
						(LAMINATED)	
1275-1280						SAME AS ABOVE	
1280-1285						SAME AS ABOVE	
1285-1295						NOT PENETRATED - BLOWN OUT	
						WHILE ATTEMPTING TO REGAIN	
						CIRCULATION.	
1295						SILTSTONE, LT TO DARK	
						GRAY, LT GRAY MATERIAL	
						IS CALCAREOUS,	
1295-1300						SAME AS ABOVE	
1300-1305						SAME AS ABOVE, CHIEFLY	
						DARK GRAY CONSTITUENTS	
						SOME DARK BROWN SILTSTONE	
1305-1310						SAME SILTSTONE AS ABOVE	
1310-315						Siltstone - lt to dk gray	
						and lt. brown - non calc	
						finely laminated	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74 068 15

BORING NO. P2 PILOT

DATE 10-6 TITLE

ELEVATION DATUM

START 0735 COMPLETE

WATER LEVEL AFTER

EQUIPMENT USED SCHICKE FAILING

LOGGED BY MILLIKEN/WEBER

P 34

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1315-1320						CHIEFLY A COARSE SILT OR	
						V FINE SANDSTONE, GRAY,	
						NON CALCAREOUS. OTHER	
						DARK GRAY SILTSTONE, NON-	
						CALCAREOUS, FRIABLE	
1320-1325						SAME AS ABOVE	
1325-1330						ENTIRELY LT-MED GRAY	
						SILT-SANDSTONE AS DESCRIBED ABOVE	
1330-1335						SAME AS ABOVE. MINOR LIGHT	
						BROWN SILTSTONE CONSTITUENTS	
1335-1340						SAME SILTSTONE AS ABOVE	
1340-1345						Siltstone - As Above	
1345-1350						SILTSTONE, SAME AS ABOVE	
TD						WITH AN INCREASING % OF	
						LT TO DARK BROWN SILTSTONE	
						CONSTITUANTS	

NOTES:

FUGRO

7-23-73 L-013

BORING NO. P-3 Core

FIELD LOG OF BORING

PROJECT NO. 74 068

DATE 10·12 TITLE Sun Phillips Scho

START 10-11-74 COMPLETE

EQUIPMENT USED LAYNE WESTERN FAILING

BORING NO. P-3 CORE

ELEVATION DATUM

WATER LEVEL AFTER

LOGGED BY M TURNER

Page I A

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
0 - 18		1	AIR ROTORY		CHIPS	SAND & GRAVEL, ALLUVIAL AND	
						COLLUVIAL DEPOSITS	SOLID BEDROCK AT 18 FEET
20 - 25		2	AIR ROTORY		CHIPS	SANDSTONE, LIGHT BROWN,	
						VERY FINE GRAIN TO FINE GRAIN	
						MODERATELY HARD TO HARD	
						FAINTLY LAMINATED	
25 - 30		3	AIR ROTORY		CHIPS	SILTSTONE, GRAY, HARD TO VERY	
						HARD, VERY CALCAREOUS	
30 - 35			AIR ROTORY		CHIPS	SAME AS ABOVE	
35 - 40		4	AIR ROTORY		CHIPS	SILTSTONE, GRAY TO DARK GRAY	
						HARD TO VERY HARD, VERY	
						CALCAREOUS, SLIGHTLY MICACEOUS	
						FAINTLY LAMINATED	
40 - 45		5	AIR ROTORY		CHIPS	SANDSTONE, VERY FINE GRAIN	
						TO FINE GRAIN, LIGHT BROWN	
						AND LIGHT GRAY CHIPS,	
						MOD.HARD TO HARD	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10·12 TITLE SUN Phillips Sohio Oil
START 10·11·74 COMPLETE
EQUIPMENT USED LAYNE WESTERN-FAILING

BORING NO. P-3 CORE HOLE
ELEVATION DATUM
WATER LEVEL AFTER
LOGGED BY MATTHEW TURNER

PAGE I B

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
45-50		6	AIR ROTORY		CHIPS	SILTSTONE, GREY TO DARK GREY, HARD TO VERY HARD, FAINTLY LAMINATED, VERY CALCAREOUS	
50-55		7	AIR ROTORY		CHIPS	SANDSTONE, MIXED LITHOLOGY, SILTSTONE LIGHT GREY SANDSTONE, MEDIUM GRAIN BIOTITE, WELL SORTED LIGHT GREY SILTSTONE. FAINTLY LAMINATED	
55-60		8	AIR ROTORY		CHIPS	SILTSTONE, LIGHT GREY c̄ DARK GREY BLACK, MOD. HARD TO HARD, FAINTLY LAMINATED, ORGANIC REMAINS	
60-65		9	AIR ROTORY		CHIPS	SILTSTONE, LIGHT GRAY HARD TO VERY HARD	
65-70		10	AIR ROTORY		CHIPS	SILTSTONE, BROWN, HARD	
							END AIR ROTORY 70'

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3 CORE
DATE 10/18/74 TITLE SUN-PHILLIPS-SOHIO
ELEVATION ______ DATUM ______
START 10/13/74 COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED LAYNE-WESTERN FAILING 2500 6 3/4" DIAMOND BIT, ROTORY/AIR
LOGGED BY W. R. LUND

Pz I C

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
6885-69.55		RUN 1	3" CORE	100	100%	Quartz Wacke; 2.5YR 6/0 gray, fine to	
						v.fine, subrounded to rounded, poorly	
						sorted qtz. grains in a 10-20%	
						matrix of silt size material, trace	
						feldspar, 5-7% v.fine grained biotite & muscovite,	
						noncalc., mod. hard to hard, nonfractured,	
						no apparent fossils, bedding indistict-poss	
						massive.	
69.55-70.13					100%	Sandy Siltstone; 5Y 5/1 gray, mixture	
						of v.fine sand & silt ≈ 40-60, poorly sorted;	
						sand predominantly rounded v.fine qtz.	
						grains w/occ. biotite & muscovite, noncalc,	
						med. bedded, mod. hard, horizontal parting	
						planes at 69.55' & 69.82' - faces smooth	
						& no coatings, nonfossiliferous.	
70.13-83.85				100%	100%	Quartz Wacke - Feldspathic Quartz Wacke;	
						5Y 5/1 gray to 7.5N4 gray, v.fine to	
						med. grained, subrounded to rounded,	
						poorly sorted qtz. grains, w/ 3-5%	
						platy muscovite & biotite and 5-12%	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/18/74 TITLE SUN-PHILLPS-SOHIO
ELEVATION ______ DATUM ______
START 10/18/74 COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED LAYNE WESTERN FAILING 2500 6 3/4" DIAMOND BIT, ROTORY/AIR
LOGGED BY W. R. Lund

68.85 62.
3.92 - 9.12 .5.35
72.77 73.77 74.20

RQD

P-2

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						subangular feldspar w/ a silt matrix	
						ranging from ≈ 10-25%, ≈ 3% accesory	
						minerals, noncalc. to slt. calc., med.	
						bedded though locally thinly bedded	
						showing graded bedding and occ. distored	
						beds, parting planes at 72.8", 73.8',	
						74.2', 74.9', 75.7', 77.8, 79.1' 80.3', fossils	
						scattered throughout c̄ locally v. abundant,	
						mostly carbonitized plant matter i.e. leaves,	
						twigs & gen. hash - core gritty to feel.	
83.85-		Run		100%	100%	Same as above	
86.36		2					
86.36 →				100%	100%	Sandstone: light grey (N7)	
87.57						moderatley hard, fine-grained	
						poorly sorted, massive,	
						moderatley calcareous, non	
						Fractured, non-fossiliferous	
						some organic stringers, (almost	
						pure tuffaceous Material)	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. D-3
DATE 10/19/74 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED L-W Air Rotary Failing 2500
LOGGED BY M Siembieda

D-3

DEPTH	SAMPLES			RQD Blows or Force		DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type		Recovery, Condition		
87.57 -				100	100	Sandstone, medion grey (N5)	
88.80						(salt + Pepper), medion-grained,	
						massive, moderatley hard, [illegible] poorly	
						sorted, very slightly calcareous	
						some organics and [illegible]	
						quartz, non-frectored, non-	
						fossiliferous	
88.80 →				100	100	Sandstone, light grey (N7) to	
89.64						Medion dark grey (N4) soft to	
						moderatley hard, graded	
						(very-fine grained at top to	
						medion grain at botton)	
						moderatley sorted, very	
						slightly calcareous, generally	
						massive. Non-fractured,	
						non-fossiliferous. some organic	
						stringers, [illegible]le quartz	
						and mica (biotite?)	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-3

DATE 10/19/74 TITLE

ELEVATION DATUM

START COMPLETE

WATER LEVEL AFTER

EQUIPMENT USED L-W Air Rotary Failing 2500

LOGGED BY M Siembieda

P4A

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
89'64' →		2 cont		100	100	Sands tone: light grey (N7) to	
110.75						Medion dank grey (N4) (salt + pepper)	
						soft to moderatley hard, fine-	
						grained to medion grained, moderatley	
						sorted, generally massive	
						with sone local bedding,	
						non-calcareous to slightly	
						catearcous, some slightly porous layers	
						with H_2S gas (?), some organic	
						stringers, with areas of high	
						concentrations 98.00 → 98.80	
						104.00 → 105.20 (inclined bedding	
						at this interval) and 108.8 - 108.9.	
						non-Fractured, non-fossiliferoos.	
						sandstone contains, quartz	
						mica, tuffaceous material	
110.75				70	100	Siltstone: light grey (N7) to	
115.16						medion grey (N5) [with some	
						hues of red, green and blue]	
						soft to moderatly hard	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74- 068
BORING NO. P-3
DATE 10/19/74 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED L-W Air Rotary Failing 2500
LOGGED BY M Siembiedo

p4(B

RQD

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
110.75 →						Thin-bedded, slightly calcareous	
115.18						to non-calcareous. Possible	
cont						Parting Planes at 111.15' and	
						112.85' with rubble zone (Joints?)	
						From 114 → 115.18, possible	
						mica and/or pyrite present	
115.18 →		3		100	100	Siltstone grading in and out	
143						to a very-fine sandstone	
						lightgrey (N7) to mediun grey (N5)	
						(slight greenish tint), generally	
						hard with some slightly	
						softer zones, moderatley	
						sorted, slightly calcareous	
						(upper zone) to non-calcareour	
						(lower Zone), bedding ranger	
						from massive to very thinly	
						bedded, some differential	
						compaction and titled	
						bedding, non-fossiliferous.	
						A zone of interbedded fine	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. D-3

DATE 10/11/74 TITLE

ELEVATION DATUM

START COMPLETE

WATER LEVEL AFTER

EQUIPMENT USED L-W Air Rotary Failing 2500

LOGGED BY M. Siembied

PS

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
115.18 143		3				sands and siltstones occurs	
cont'						between 137→139. Joint	
						occurs between 124.95 to	
						125.70, it is smooth and slightly	
						curved. Some pyrite and	
						gilsonite occurs. Parting	
						planes occur at 116.36	
						118.32, 120.73, 123.23	
						124.95, 125.70, 127.91, 130.18	
143-173		4		92	100	Siltstones and Very-fine grained	
						sandstone (becoming less sandy	
						at depth) light grey (N7) to	
						brownish grey (5YR 4/1)	
						moderatley hard to hard, medium	
						grained to silt, generally	
						massive with some bedding.	
						moderatley sorted, locally	
						poorly sorted, some organic	
						stringer, minnor amounts	
						of pyrite, gisonite, possibly	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/19/74 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED L-W - Air Rotary Failing 2500
LOGGED BY M. Siembiedo

D-6

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
143-173		4				Mica +Quartz. non-calcareous,	
cont						[illegible], non-fossiliferous	
						some differential compaction	
						where bedding is observable.	
						Parting planes at 145.10,	
						148.10, 152.00, 157.14	
						159.43, 163.43, 168.45	
						Rubble zone occurs between	
						171.3 → 173. possible do to	
						Jointing	
10/20/74 W. E. LUND							
173-185.7'		5	3" CORE		100%	SILTSTONE; dk. yellowish brn. 10YR 4/2,	
						90%+ grains silt or below, well sorted,	
						calc. to slt. calc (decreasing w/ depth)	
						bedding poorly defined - massive,	
						mod. hard to hard, slt. petroliferous,	
						locally micaceous, rubble zone at	
						175.6' w/ hackly fractures, horizontal	
						parting planes at 182.25', 185.5' &	
						185.7', abundant carbonitized plant hash	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/20/74 TITLE SUN-PHILLPS-SOHIO
ELEVATION ______ DATUM ______
START 00:00 COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED LAYNE-WESTERN FAILING 2500, 6¾ DIAMOND BIT, ROTORY AIR
LOGGED BY W.R. LUND - J. CRANOR

P. 7

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
185.7'-186.4'		5	3" CORE	100%	100%	Tuff-Tuffaceous Siltstone; mod. yellow brn. 10YR 5/4, 90% silt or below, well sorted, slt. to mod. calc., laminated-distorted & interfingers w/ siltstone above, hard, upper contact marked by an inclined frac. - frac changes inclination from ≈25° to ≈85° - face rough - non coated, nonfossiliferous.	
186.4'-188.9'		5	3" CORE	100%	100%	siltstone; dk. yellow brn. 10YR 4/2, 90% grains silt or below, well sorted, slt. calc., bedding poorly defined, hard, occ. v. small particles plant remains.	
188.9'-189.2		5	3" CORE	100%	100%	Interbedded Tuff & Siltstone; dk. yell. brn. 10YR 4/2 to mod. yell. brn. 10YR 5/4, 90% silt or below, well sorted, calc., crudly bedded - v. irregular (differential compaction?), hard, nonfossiliferous.	
189.2' - 191.3		5	3" CORE	100%	100%	siltstone; lt. gray N-7 to med. lt. gray N-6, 90% silt or below, well sorted, slt. calc.	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-3

DATE 10/30/74 TITLE SUN-PHILLPS-SOHIO

ELEVATION ______ DATUM ______

START 20:00 COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED LAYNE-WESTERN FAILING 2500
6 3/4" DIAMOND BIT, ROTORY AIR

LOGGED BY W. R. Lund & J. Cravor

P-8

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						bedding indist.-massive, mod. hard to	
						hard, occ. thin <1/2" irregular patches	
						of tuffaceous material 10YR 5/4, fractures	
						at 189.2' 70°, 189.7' 70°, 190.4' 75°, 191.6'	
						50°, fracture faces are irregular & locally	
						have calcite coatings, occ. v. fine	
						plant remains. last .5' 3 healed frac. at	20°, 50°, 80°
191.8-193.2		5	3" CORE	100%	100%	Interbedded Tuffs & Siltstones; mod. lt.	
						gray N-7 to grayish orange pink 5YR 7/2,	
						90% silt or below, well sorted, slt. calc.	
						laminated to v. thinly bedded - v.	
						irregular "wavey", hard (silicious?),	
						fracture at 192.25' at 70° face clean but	
						irregular, nonfossiliferous - lower contact	
						gradational into underlying silts	
193.2'-203.8		5	3" CORE	100%	100%	Tuffaceous Wacke; med. gray N-5, to grayish brn. 5YR 3/2	
		& 6				v. fine grained, poor to mod. sorting, subrounded	
						to rounded, 10-15% silt matrix, qtz, mica,	
						feldspar % difficult to determine - possably	
						glass shards, noncalc. to mod. calc., bedding	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/20/74 TITLE SUN-CHILLER - SOLAR
ELEVATION ________ DATUM ________
START 00:00 COMPLETE ________
WATER LEVEL ________ AFTER ________
EQUIPMENT USED FAILING 2500, 6 3/4 DIAMOND BIT ROTORY/AIR
LOGGED BY W. R. Lund & T Cranor

P 9

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						indistinct-massive, mod. hard to hard, frac.	
						at 70° at 194.5', horizontal parting planes	
						at 193.5', 198.4', 200.8', 202.3', 204.9',	
						205.4, & 208.6, 30° frac. at 204.6 - frac.	
						faces are rough & irregular; small fossil	
						plant frags abundant throughout	
08.8-209.0		6	3" CORE	NA	100%	Tuff-Tuffaceous Siltstone; lt. brn. 5YR 5/6	
						to mod. yell. brn 10YR 5/4, 90% silt or below,	
						well sorted, noncalc., laminated-bedding	
						contorted, hard, fracture between 30°-50°	
						coincides w/ this interval - frac. faces v.	
						irregular, fossil plant frags present.	
209.0'-222.3		6	3" CORE	92-97%	100%	Tuffaceous Wacke; med. dk. gray N-4	
						to brnish gray 5YR 4/1, v. fine to fine	
Note: Contact w/ material						grained, poorly sorted, subrounded to	
below is gradational						rounded qtz grains, with 5-10% mus-	
222.3' is relatively arbitrary						covite & biotite, % silt matrix increasing	
but marks the upper change						with depth, noncalc. to locally mod.	
						calc., bedding indistinct - thick to	
						massive, hard, horizontal parting planes and	

NOTES:

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/20/74 TITLE SUN-PHILLPS-SOHIO
ELEVATION ______ DATUM ______
START 00:00 COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED LAYNE-WESTERN FAILING 2500
6 3/4" DIAMOND BIT, AIR/ROTORY
LOGGED BY W. LUND & J. Cranor

P-10

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						Fractures at 210.8'-20°, 211.5, 211.8,	
						213.5, 216.4, 216.8, 218.2, 218.6, 219.3,	
						219.6, 220.6, 221.2, 221.9, 222.7 all	
						hrz, many frac. faces smooth-	
222.3-237.4		6	3" CORE			Sandy Siltstone (~~tuffaceous~~); med. lt. gray	
	Note 3.24' core					N-6 to med. gray N-5, ≈70% silt & 30%	
	unrecovered in					sand (varies & is gradational from above),	
	this run - believe					sand predominantly qtz & mica (biotite)	
	that it is from					& possible feldspar, glass? - all grains	
	this interval.					v. fine grained, noncalc. to slt. calc.,	
	(222.3 - 234.99)					bedding indistinct - massive, mod. hard	
						to soft?? (believe that this is	
						the interval containing the 3.24' of	
						no recovery), horizontal parting planes	
						and inclined fracs abundant - representative 10°-20° occ. vert., imposs-	
						able to locate accurately due to missing	
						core, most faces smooth - some irreg.	
						surfaces, small pieces of plant remains	
						common. At 233' disseminated pyrite	
						becomes abundant - core recovery becomes	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-3

DATE 10/20/74 TITLE SUN-PHILLIPS-SOHIO

ELEVATION ______ DATUM ______

START 08:00 COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED LAYNE WESTERN FAILING 2500
6 3/4" DIAMOND BIT, ROTORY/AIR

LOGGED BY W. LUND & J. CRANDD
P-11

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						better	
237.4'-237.7'		7	3" CORE	100%	100%	Interbedded Siltstones & Tuffs; mod.	
						brn. 5YR 4/4 (tuffs) to lt. olive gray 5Y 5/2 to	
						olive gray, 5Y 3/2, 90% grains, silt or	
						below, well sorted, slt. to mod. calc.,	
						v. thinly bedded - distorted, hard, frac.	
						at 237.45' - 25°, nonfossiliferous	
237.7-239.6		7	3" CORE	99%	100%	Sandy Siltstone; med. gray N-4, ≈ 25% sand	
						75% silt, poorly sorted, sand predominantly	
						subrounded qtz, some mica, noncalc., bedding	
					gradational	indistinct, hard, nonfrac., nonfossiliferous	
239.6-242.7		7	3" CORE	100%	100%	Sandy Siltstone - Silty Sandstone (Wacke);	
						lt. olive gray 5Y 5/2 to med. gray N-5 w/	
						occ. streaks of mod brn 5YR 3/4, locally	
						50:50 sand-silt, v. thinly bedded - beds	
						irregular (differential compaction?), non	
						to slt. calc., hard, hrz. parting plane	
						at 239.4' & 242.1 - surfaces are rough &	
						irregular - abundant disseminated pyrite,	
						slt petroliferous locally	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

DATE 10/20/74 TITLE SUN-PHILLPS-SOHIO

START ____ COMPLETE ____

EQUIPMENT USED LAYNE-WESTERN FAILING 2500
6 3/4 DIAMOND BIT, ROTORY/AIR

BORING NO. P-3

ELEVATION ____ DATUM ____

WATER LEVEL ____ AFTER ____

LOGGED BY W. R. LUND & J. CRANOR
PR

DEPTH	SAMPLES			ROD Blows or Force		DESCRIPTION	REMARKS
		No.	Type		Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
242.7'-255.3		7	3" CORE	100%	100%	Siltstone; lt. gray N-7 to med. dk. gray N-4, 90% grains silt or below, wellsorted, med. calc, laminated-v. regular with local differential compaction, hard, abun. diseminated pyrite, parting planes at 242.3', 244.6', 246.5', 247.5, 248.7, 249.7, 251.35', 253.7', 255.1; carbonatized plant remains.	
255.3-257.1		7	3" CORE	100%	100%	Interbedded Sandy Siltstone and Silty Sandstone; lt. gray N-7, med. dk. gray N-4 to pale brnish gray 10YR 6/2, silt to v. fine grained sand, poorly sorted, predominantly subrounded qtz. & mica, thinly bedded to laminated, hard, nonfrac., abun. plantremains	
257.1-258.5		7	3" CORE	100%	100%	Siltstone, med. dk. gray N-4, 90% grains silt or below, slt. calc., thickly bedded, hard, horizontal frac. at 257.5 at 258.4 irregular bleb (≈1½" dia) of pyrite, marcasite, and calcite.	
258.5-~~263~~ 265.55		7	3" CORE	100%	100%	Siltstone; med. gray N-5 to med. dk. gray N-4, 90% grains silt size or below, slt.	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/20/74 TITLE SUN-PHILLIPS-SOHIO
ELEVATION ______ DATUM ______
START 08:00 COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED LAYNE-WESTERN FAILING'S 3500, 6¾" DIAMOND BIT, ROTORY/AIR
LOGGED BY W.R. LUND & J. CRANOR

P 13

RQD

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						calc. to calc., laminated to thinly bedded,	
						hard, parting planes at 260.15, 262.25,	
						262.7, faces rough & irregular but non-	
						coated, pyrite locally abundant - 260.15'	
						to 260.6' numerous blebs of pyrite	
						Note! Belive that the .19' of	
						non recovery is between 263' & 265'	
265.33		8		100	100	Tuff: light olive gray (5Y 6/1)	
267.48						hard, silt size grains, very	
						thinly bedded, poorly sorted	
						secondary calcite intergrowth	
						otherwise non-calcareous	
						possible mica, pyrite crystals	
						very dense material, non-	
						fractured, non fossiliferous	
267.48		8		~~100~~	100	distinctive zone	
≈288.50				100	100	Siltstone (Marlstone?) Yellowish	
						grey (5Y 7/2) to light olive grey	
						(5Y 5/2) and dark yellowish	
						brown (10 YR 4/2), hard to	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/30/74 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED L-W Air Rotary Failing 2500
LOGGED BY M Siembieda

P 14

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
267.48 →						very hard, silt size particle	
288.50						possible some very fine sands	
cont						generally massive (some thin	
						bedding between 270.40 → 270.80)	
						highly calcareous. non-fossiliferous	
						non-fractured, gisonite and	
						~~er~~ possible organics occur occassionly.	
						Section has been altered by	
						groundwater, (case harden?)	
						random zones of "weathered	
						out", porous material (more	
						evident at bottom of section)	
						appears to be different	
						lithology but is the same	
288.50 →		8		100	75	Sandstone (Toff?) pale yellowish	
293						brown (10 YR 6/2) to brownish	
						gray (5 YR 5/1), hard, very fine-grained	
						to medion-grained, generally	
						massive, with some thin	
						beds, moderatley sorted	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
ATE 10/20/74 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED L-W Air Rotary Failing 2500
LOGGED BY M. Siembiedy

S.A

P ~~25~~ 15

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						gilsonite (some veins) quartz	
						grains, mica, possible organics	
						non-calcareous, porous	
						non fossiliferous, possible	
						joints but may be mechanical	
						at 289.5 and 290.5.	
0/21/74	W. R. LUND						
293-294.9		8/9	3" CORE	100	100	Tuffaceous Wacke; pale yellowish	
						brn. 10YR 6/2, v. fine to fine grained,	
						subrounded, poorly sorted, predominantly	
						qtz., mica (biotite), feldspar? (alkali),	
						glass? (devitrified), noncalc to v.	
						slt. calc, thinly bedded w/apparent	
						local graded beddeding, hard, brg.	
						parting planes at 293.3', 294.3' & 294.9',	
						fine specks of organic? material scattered	
						throughout	
294.9-296		9	3" CORE		100%	Siltstone; pale brn. 5YR 5/2, 90%	
						silt size but silt is approaching	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/21/74 TITLE SUN-PHILLPS-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED LAYNE-WESTERN FAILING 2500, 6 3/4" DIAMOND BIT, ROTORY/AIR
LOGGED BY W. R. Lund
⑤
P. 16

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows/ or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						the lower limit of sand size, poor to mod sorting, noncalc, hard, hrz. parting plane at 295.3', scattered carbonitized plant fragments	
296'-297.3		9	3" CORE	100	100	Sandy Siltstone - Silty Sandstone, pale brn. 5YR 5/2, v. fine grained, subrounded, poorly sorted, sand predom. qtz. w/ some mica, noncalc, bedding indistinct, hard, nonfiss, carbonitized plant remains common	
297.3-297.6		9	3" CORE	100	100	Petroliferous CLAYSTONE, blkish gray 5R 2/2 to v. dusky red 10R 2/2, appears extremely fine grained (clay), well sorted, slt. calc, med bedded, hard, hrz. parting plane w/ v. smooth faces (polished), nonfossiliferous.	
297.6-299.1		9	3" CORE	100	100	Siltstone, grayish brn 5YR 3/2 to pale brn 5YR 5/2, generally 90% grains silt or below - sand may approach 15%, slt. calc, bedding indistinct - massive, nonfiss, nonfossiliferous	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-069
BORING NO. P-3
DATE 10/21/79 TITLE SUN-PHILLIPS-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED LAYNE-WESTERN FAILING 2500
6 3/4" DIAMOND BIT, ROTORY/AIR
LOGGED BY W. R. LUND
(SP) (fantastic)
P. 17

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
299.1-299.2		8	3" CORE	100	100	Petroliferous Claystone; v thin horizon,	
						similar to that described above.	
299.2-302.8		9	3" CORE	100	100	Sandy Siltstone; greyish brn 5YR 3/2 to	
						pale brown 5YR 5/2, approx 25% v	
						fine sand 75% silt, sand subrounded	
						to rounded, poorly sorted, sand predom.	
						qtz, med. calc, thinly bedded to locally	
						laminated, hard, horiz. parting plane	
						at 300.5' corresponding to a zone	
						of lower sand content, nonpetroliferous	
302.8-323		9	3" CORE	18% → 100%		Silty Claystone; grayish red 5R 4/2 to	
						dusky brown 5YR 2/2, predominantly	
						clay w/ a significant silt fraction -	
						v few individual grains visable under	
						a 14x hand lense, poor to moderatly	
						sorted, (Floculated clay may give the	
						impression of a higher silt content than	
						is actually present), med. calc to	
						calc., rock initially appears massive	
						but close observation of vertically	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/31/74 TITLE SUN-PHILLIPS-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED LAYNE-WESTERN FAILING 2500 6 3/4" DIAMOND BIT, ROTORY/AIR
(s.*)
LOGGED BY W. R. LUND
P18

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						split surfaces reveal v. fine laminae,	
						hard, from 302.8 to 314.3 the rock	
						is extremely fractured & it is from	
						w/in this interval that the 1.28'	
						of nonrecovery occured, RQD in this	
						interval is v. low ≈18%, fracs are	
						hrz. w/smooth surfaces, however from	
						305.3 to 307.2 the rock is split by	
						a vert frac. the faces of this frac	
						are smooth but coated w/a sandy	
						calcite, below 314.3 recovery was 100%	
						& RQD was 100% from 318.6 to 319.5	
						the core is split by another vert. frac.,	
						this frac. is intact having been healed	
						w/ secondary calcite, horizontal parting	
						planes exist at 317.8', 318.1', 319.9',	
						nonfossiliferous, siltly petroliferous	
						(slt. odor.)	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-3

DATE 10/21/74 TITLE

ELEVATION DATUM

START COMPLETE

WATER LEVEL AFTER

EQUIPMENT USED L-W Air Rotary Failing 2500

LOGGED BY H. Siembieda

S.H. 10/22

P 19

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
323-353		10		86	100	silty Clay Stone: Pale yellowish brown ~~to~~ (10YR 6/2) to Grayish brown (5YR 3/2) predominatley claystone with silt comprising ≈20%. hard to very hard, thinly laminated, ~~poorly~~ well sorted moderatley calcareous to highly calcareous. some ~~fr~~ very fine crystels of pyrite, +Mica some gilsonite and possible organic stringers. non-Fossiliferous, very homogeneous throughout section. Thear appears to be ~~[illegible]~~ Numerous parting planes but are probably mechanical breaks (highly polished) From 328 → 331 a zone of Joints, rocks is highly broken, evidence of 3 Joints occuring at roughly 30° 30° 120° all are smooth and flat.	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/22/74 TITLE SUN- PHILLIPS-SOHIO
ELEVATION ____ DATUM ____
START ____ COMPLETE ____
WATER LEVEL ____ AFTER ____
EQUIPMENT USED LAYNE-WESTERN FAILING 2500
6¾" DIAMOND BIT, ROTORY/AIR
LOGGED BY W. R. LUND
P. 20

s.A 10/22

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force RQD	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
353.0-353.5		10/11	3" CORE	100	100	Petroliferous Claystone - Shale; grayish black N-2, +90% grains silt or below, well sorted, slt. calc., laminated-beds distored by differential compaction, hard, brz parting plane at 353.3' w/ v. smooth surface (core spinning), definate petroliferous oder, nonfossiliferous	
353.5-354.4		11	3" CORE	100	100	Silty Claystone, shale; grayish brown 5YR 3/2, clay size with approx 20-25% silt, poor to mod. sorting, noncalc. to locally slt. calc., laminated - appears v. regular, hard, brz parting planes at 356.9' and 358.7', petroliferous oder not apparent; however, grades downward to a ?	
359.4-369.7		11	3" CORE	98% ~~100~~	100	Petroliferous Claystone - Shale; dusky brn. 5YR 2/2 to v. dusky red 10R 2/2, clay size material w/approx 25-30% fine silt (up slightly from above), poorly sorted, v. slt. calc., laminated - indistinct, hard, definate petroliferous oder, occ. isolated	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/22/74 TITLE SUN-PHILLPS-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED LAYNE-WESTERN FAILING 2500 6¾ DIAMOND BIT, ROTORY/AIR
LOGGED BY W. R. LUND

s.h

P.21.

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						blebs of bitumen?, locally the petrolium content increases producing .1'-.2' v. dark horizons, 3 .1' tufflaceous stringes occur in the interval 367.5 - 368.7 - irregularly bedded and more porous than the material above and below, hrz. parting planes occur at 360.2', 361.4', 362.4', 363.5', 363.6, 363.8, 365.2', 366.6', 367.4, 367.8 368.5, 369.2, & 369.7 - all faces are smooth and clean, nonfossiliferous	
369.7-370.1		11	3" CORE	100	100	Silty Petroliferous Claystone; (tuffaceous?) fresh surface of this material appears to be v. similar to claystone described above, however, this interval of core is rough & pitted indicating that it is siltier than the material above and below	
370.1-373.6		11	3" CORE	100	100	Petroliferous Claystone-Shale (basicly same as 354.4-369.7), grayish brn. 5YR 3/2, basicly clay w/ appreciable silt (12-20%), poorly sorted, v. slt. calc., laminated-bedding	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-3

DATE 10/22/74 TITLE SUN-PHILLPS - SOHIO

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED LAYNE-WESTERN FAILING 2500
6 3/4" DIAMOND BIT; ROTORY/AIR

LOGGED BY W.R. LUND

SA. 10/22/74

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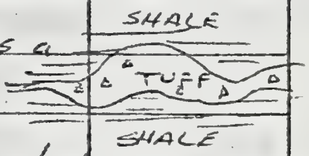
DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						appears regular w/ only local differential	
						compaction, hard, petroliferous oder, hrz.	
						parting planes at 370.1', 371.3, 371.7, 372.3	
						372.9 & 373.4, all faces are smooth &	
						clean - many appear polished.	
373.6-375.0		11	3" CORE	100%	100%	Petroliferous Shale (Oil Shale); dusky	
						brown 5YR 2/2 to brnish blk 5YR 2/1, clay	
						size - maybe 10% silt, well sorted, noncalc.,	
						to slt. calc., laminated - bedding v. well	
						dev. and apparant in core, - generally wavey	
						with many pinch and swell structures, a	
						.05' v. irregular stringer of tuff - grayish	
						orange 10YR 7/4 occurs at 374.6' - this	
						horizon also pinches & swells and has a	 SHALE TUFF SHALE
						v. wavey lower contact w/ the shale	
						hard, strong petroliferous oder & abundant	
						specks of bitumenous material visable w/ a	
						14X lense, hrz parting planes at 374.3' &	
						374.9', nonfossiliferous	
375.0 - 377.3		11	3" CORE	50%	100%	Tuffaceous Sandy Siltstone; pale yellowish	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/22/74 TITLE SUN-PHILLPS - SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED LAYNE-WESTERN FAILING 2500
6 3/4" DIAMOND BIT, ROTORY/AIR
LOGGED BY W. R. LUND
Ⓢ.Ⓐ 10/27/74
P. 23

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						brown 10YR 6/2, silt-sand ratio 60-40	
						locally may be 50-50, sand appears to	
						be v. fine grained rounded qtz. w/ occ.	
						v. fine platy mica, bedding is indistict-	
						may be massive, slt. calc. though locally	
						v. calc., mod. hard - core is pitted,	
						appears to contain carbonitized plant	
						remains, hrz. parting planes at 375.2,	
						375.5, 375.9, 376.3, w/ a vert. frac. splitting	
						the core from 376.6 to 377.3	
377.3-382.9		11	3" CORE	77%	77%	Clayey Siltstone; grayish brown 5YR 3/2	
						to mod. brn. 5YR 3/4, initially appears	
						v. similar to claystones above; however,	
						v. fine, well rounded qtz? grains are	
						definatly visable under a 14X lense, I	
						belive these grains are < 1/16 mm in dia,	
						poorly sorted, slt. to mod calc., v. thinly	
						bedded to laminated, hard, core breaks	
						w/ a sltly hackly fracture, hrz. parting	
						planes at 377.9, 378.9, 379.5 - and	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-3

DATE 10/22/74 TITLE SUN-PHILLPS-SOHIO

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED LAYNE-WESTERN FAILING 2500
6 3/4" DIAMOND BIT, ROTORY/AIR

LOGGED BY W. R. LUND

S.P. 10/27/74

P. 24

Ron

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						below 380' - I believe that the 1.4'	
						of missing core came from below	
						380', nonfossiliferous, v. faint petroliferous	
						oder	
382.9		10		78	100%	silty claystone: dark yellowish	
396.5						brown (10YR 4/2) to dusky brown	
						(5YR 2/2) very hard, thinly	
						laminated, poorly sorted,	
						moderatley calcareous, some	
						petrollifes present, possible mica.	
						Nacholite occurs as veins	
						and diseminated through rock,	
						non-fossiliferous, differentiated	
						compacted. Claystone is	
						randomly inter bedded with	
						fine-grained sandstone (tuff)	
						light brown (5YR 6/4), hard	
						highly calcareous, thickness	
						ranges from .01' to .15'	
						at 391 heavey concentration	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-3

DATE 10/22/74 TITLE

ELEVATION DATUM

START COMPLETE

WATER LEVEL AFTER

EQUIPMENT USED L-W-Air Rotary Failing 2500

LOGGED BY M. Siembieda

(S.A.) 10/27/74

25

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force RQD	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
		10				of sandstons. From 392.3 → 392.7	
						vertical Joint, rough, irregular,	
						, "~~[illegible]~~ does not penetrate	
						entirely through core.	
396.5				87 100	87	Tuff: Pale yellowish brown	
411						(10YR 6/2) soft to moderatley	
						hard, fine-grained, massive, Porous	
						non-calcareous. Inclusions of	
						calcite, feldspar(?), gilsonite	
						pyrite (some small veins or vugs	
						occuring), non-fossiliferous, ~~[illegible]~~.	
						non-fractured, homogeneus	
411-~~[illegible]~~.6			11	93	100	Silty claystone: Grayish	
415.7						brown (5YR 3/2) hard, very	
						thinly laminated, silt comprises	
						≈ 15% of composition of rock	
						poorly sorted, moderatley	
						calcareous, non fossiliferous	
						some inclined bedding and	
						differentiated compacted.	

NOTES:

FUGRO

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17.3

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/22/74 TITLE
ELEVATION
DATUM
START
COMPLETE
WATER LEVEL
AFTER
EQUIPMENT USED L-W - Air Rotary Failing 2500
LOGGED BY M. Siembiedo

(5.11) 10/23
RQD
26

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
411 → 415.7		11				possible nacholite in upper	
cont'						region of section, sone cavities	
						also in upper section. At	
						417.4 either a low angle Joint	
						or Parting plane, (runs parallel	
						to bedding)	
415.7 → 428		11		91	100	Claystone (marlstone) Dusky	
						brown (5YR 2/2) with some	
						Pale Yellowish brown (10 YR 6/2)	
						hard, generally massive, small	
						percentage of silt, poorly	
						sorted, highly calcareous,	
						lighter colored material	
						tends to be more calcareous,	
						non-fossiliferous, non-fractured.	
						Sone cavities at 418, 421	
						422.9, [possible locations of	
						nacholite (?)], homogeneous	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74- 068

BORING NO. P-3

DATE 10/22/74 TITLE

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED L-W Air Rotary Failing 2500

LOGGED BY M. Siembieda

(S.A) 10:33 RQD 27

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
428→		11		85	100	Claystone: Moderate brown	
431						(5YR 3/4) to Dusky brown	
						(5YR 2/2) hard, very little silt	
						thinly bedded, slightly calcarea	
						~~to~~ moderatley calcareous,	
						non-fossiliferous, Low oil	
						content. At 430, broken	
10/23/74	W.R. LUND					zone of rock possible mechanical	
431.0-434.9				11%	30%	Tuffaceous Sandstone; dk. yellowish	
						brn. 10YR 4/2, fine to med grained, angular	
Note: Most of last core						to subrounded, v. poorly sorted, abundant	
assigned to this						silt size material, slt. calc, massive,	
interval.						soft and very porous, poor recovery,	
						rock is rubbley and friable, non fossiliferous	
434.9-441.4				62%	100	Silty Claystone w/ Abundant Tuffaceous?	
						Inclusions; grayish brown 5YR 3/2 to dusky	
						brown 5YR 2/2 (claystone), pinkish gray	
						5YR 8/1 (tuff), claystone appears to be ≈ 20-25%	
						silt ~~75~~-80% clay, poorly sorted, tuff	
						is badly altered - fine qtz. grains in	

NOTES:

7-23-73

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/23/74 TITLE SUN-PHILLPS-SOHIO
ELEVATION ________ DATUM
START ________ COMPLETE ________
WATER LEVEL ________ AFTEF
EQUIPMENT USED LAYNE-WESTERN, FAILING 2500, 6 3/4" DIAMOND BIT, ROTORY/AIR
LOGGED BY W.R. LUND

S.A. 10/73

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DEPTH	SAMPLES					DESCRIPTION
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:
						a matrix of devitrified glass and feldspa
						locally tuff may appear as stringers
						but generally occurs as individual lentic
						ular pods, tuff is much softer than
						the clay stone so tuffaceous areas
						appear pitted, hrz. parting planes at
						434.9', 435.3, 435.9, 436.8', 437.0,
						437.3, 437.5, 437.8, 438.0', 438.3, 438.5
						438.8, 438.9, 439.2, 439.8, 440.1, 440.5,
						440.9, 441.4, nonfossiliferous; pods & stringers
						of tuff give core a speckled
						appearance.
441.4-442.6		13	3" CORE	30% ~~100~~	100	silty Claystone w/ Tuffaceous Horizons; med.
						gray N-5 (claystone) to lt. brnish gray 5YR 6/1
						(tuff rich bedds), 80-85% clay - 15-20%
						silt, poorly sorted, noncalc. (gray claystone)
						to med. calc. (tuffaceous layers), laminated-
						wavey bedding especially near lower contact-
						due to differential compaction, hard,
						hrz. parting planes at 441.8', 442.0, 442.3

NOTES:

is badly altered - fine qtz. grains in

7-23-73

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/23/74 TITLE SUN-PHILLPS-SOHIO
ELEVATION ____ DATUM ____
START ____ COMPLETE ____
WATER LEVEL ____ AFTER ____
EQUIPMENT USED LAYNE WESTERN FAILING 2500 6 3/4" DIAMOND BIT, ROTORY AIR
LOGGED BY W. R. LUND

P. 29

S.A 10/23

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	~~Blows or Force~~ RQD	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
442.6-449.7		14	3" CORE	0	52%	Claystone and Crystalline Calcite; blkish	
						red 5R4/2 to dusky brn. 5YR4/2 (claystone)	
						to v. lt. gray N-7 (calcite), claystone is	
						typical of that described previously, well	
						sorted, noncalc., hard, bedding is indistinct,	
						the calcite is coarsely crystalline w/ many	
						well dev. xlls visable with the handlense,	
						it occurs as irregular stringers that cut	
						bedding, as conformable horzons parallel	
						to bedding and as irregular blebs and	
						pods which may be occupying previously	
						existing cavities, a considerable amount	
						of silt is contained within the calcite	
						Recovery of core from this interval	
						was poor, the calcite is soft and	
						dissolves readily, the majority of	
						nonrecovered core - in this run ass- ~~[illegible]~~	
						igned to it, locally petroliferous,	
						nonfossiliferous, thin to med. bedding	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068-

BORING NO. P-3

DATE 10/23/74 TITLE SUN-PHILLPS-SOHIO

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED L-W FAILING 2500, 6 3/4" diamond bit, air/rotary

LOGGED BY W. R. Lund

P. 30

(5.7A) 10/23

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
449.7-452.5		14	3" CORE	33%	100%	Tuffaceous? Claystone-Shale; dk. yellowish brn. 10YR 4/2 to grayish orange pink 5YR 7/2, clay w/ abun. v. fine light colored material (tuff-or secondary min. ~~[illegible]~~?) poorly sorted, slt. calc., v. thinly bedded to laminated, locally lighter colored material appears to show graded bedding, hard, hrz. parting planes abundant - every .3' or less, nonfossiliferous, light material fizzes violently - may represent an secondary mineral replacing tuff?	
452.5-454.0		14	3" core	0%	100%	Tuffaceous Petroliferous Shale; blk N-1 to mod. brown 5YR 3/4, 70-90% (varies) clay w/ 10-30% lt. colored material (tuff - secondary minerals), poor to well sorted, slt. to mod. calc., laminated, v. regular, hard, hrz. parting planes at 453.1, 453.4, 453.6, 453.8', strong odor	

NOTES:

FIELD LOG OF BORING

PROJECT NO. 74-062
BORING NO. P-3
DATE 10/23/74 TITLE SUN-PHILLPS-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED L-10 FAILING 2500, 1 3/8" DIAMOND BIT, AIR/Rotory
LOGGED BY W. P. Lund
P. 31

S.A. - 10/23

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
454.0-456.2						Claystone w/ Calcite Stringers; grayish	
						red 5R 4/2 (claystone) to white N-9	
						(calcite), claystone 90% + clay & silt	
						size material, poor to mod. sorted,	
						noncalc., hard, bedding appears massive,	
						calcite occurs in coarse xlls and occurs	
						as irregular stringers through out the	
						rock - xlls of pyrite & marcasite? are	
						assoc. w/ the calcite, much of calcite	
						may be occupying mudcracks and	
						other voids in rock	
456.2 -		14	5" CORE	50%	90%	Tuffaceous? Petroliferous Shale; v.	
						dusky red 10R 2/2 to locally blk. N-1,	
						admixture of clay & lt. colored	
						material (altered or replaced tuff)	
						in varying amounts, slt. to locally	
						highly calc., v. thinly bedded to	
						laminated, locally concentrations of	
						lt. colored material gives the impression	
						of graded bedding - in other areas	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10/23/74 TITLE SUN-PHILLPS - SOHIO
START ____ COMPLETE ____
EQUIPMENT USED L-W FAILING 2500, 6 3/4" DIAMOND BIT, ROTORY AIR
BORING NO. P-3
ELEVATION ____ DATUM ____
WATER LEVEL ____ AFTER ____
LOGGED BY W.R. Lund
P32

S.A. 10/73

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						it makes the rock appear massive,	
						462.0-462.3 & 470.8-471.0 contain what	
						appear to be solution cavaties where	
						calcite or nacholite may have been dissolved	
						away, much of the remaining missing	
						core has been assigned to this	
						interval. for this reason it is v.	
						difficult to accuratly locate the	
						abundant horizontal parting planes and	
						few high angle 60°+ joints which occur	
						in this area. most high angle joints	
						occur below 467'	
						Note: Most of the rock in this core	
						run has contained abundant fine fragments	
						of what appears to be devitrified tuffaceous	
						material, this material almost alway reacts	
						violently to HCL, in many places appears	
						spherulitic, and occasionally contain a	
						translucent mineral. Locally this material	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-3

DATE 10/23/74 TITLE Sun-Phillips-SOHIO

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED L-W FAILING 2500, 6 3/4" DIAMOND BIT, ROTORY/AIR

LOGGED BY W. R. LUND

P.33

S.A. 10/23.

RQD

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						exhibts what appears to be graded	
						bedding. I think this material	
						represents a devitrified or replaced	
						tuff.	
48.2 →		15		55	80	Continuation of same lithology	
cont						rock is badly broken	
						at 491, gilsonite and	
						weathered Pyrite and/or mica	
						occurs, high angle Joints	
						at 482, 484, 499. Particulary	
						poor recovery between 495 →	
						499. Saloution cavities (Vugs)	
						at 471, 474, 496, 498.	
						these contain highly calcareous	
						material (Nacholite, calcite)	
						they do not seen to follow	
						any particular bed, Joint or	
						fracture, occuring randomly.	
						Some differential compacting	
						causing minor offset can be	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-3

DATE 10/24/74 TITLE SUN-PHILLPS - SOHIO

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED LAYNE-WESTERN FAILING 2500
6 3/4" DIAMOND BIT, ROTORY/AIR

LOGGED BY W. R. Lund

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DEPTH	SAMPLES			RQD		DESCRIPTION	REMARKS
	⇀	No.	Type	~~Blows or~~ Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						seen in the polished rock	
						breaks, [offsets of .01']	
					[illegible]	Tuff content decreasing at	
						depth, but otherwise appears	
						to be same lithology	
10/24/74		W.	R. Lund				
500-502.8		15	3" CORE	40%	70%	Petroliferous Claystone, (shale); grayish	
						red 10R 4/2 to blk. N-1, 90% clay & silt,	
						poor to mod sorting, noncalc. to locally	
						mod. calc., recovery & RQD this interval	
						was low, rock contains relatively large	
						vugs or cavaties from which it	
						appears minerals have been dissolved,	
						one such cavity contains a mineral	
						of massive to platy habit (locally micro	
						box work structure developed), mod. pink	
						5R 7/4 in color, which is hard >5 and	
						does not react to HCl, remainder of	
						cavity appears to be coated w/ a fine	
						granular bituminous material.	

NOTES:

FUGRO

FIELD LOG OF BORING

OJECT NO. 74-068
BORING NO. P-3
DATE 10/24/74 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED LAYNE-WESTERN FAILING 2500
6 3/4" DIAMOND BIT, ROTORY/AIR
LOGGED BY W.R. Lund
(S.A.) 10/24
P.35

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						rock has definate odor, parting planes numerous but unable to locate accurately due to poor recovery, rock contains some apparently tuffaceous material which decreases w/ depth - by 500' only a minor constituent.	
2.5'-508.5		16	3" CORE	91%	100	Claystone-Shale; grayish red 5R 4/2 to dk. reddish brown 10R 3/4 90%+ clay or silt, wellsorted, mod calc., laminated to thinly bedded - bedding generally indistinct, hard, locally petroliferous, hard, hrz. parting planes at 503.7, 504.6, 505.8, vert frac. between 503.0 and 503.5 - parting plane faces smooth and clean (polished)	
508.5-511.1		16	3" CORE	98%	100%	Tuffaceous? Claystone-Shale; dk. reddish brown 10R 3/4 to blk N-1 (locally), 85% clay 15% small white specks (devit. and replaced tuffs?) poorly sorted, med. calc. - specks v. calc., v. thinly bedded to laminated - bedding generally indistinct,	

OTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74068
BORING NO. P-3
DATE 10/24/74 TITLE SUN-PHILLPS-SOHIO
ELEVATION ________ DATUM ________
START ________ COMPLETE ________
WATER LEVEL ________ AFTER ________
EQUIPMENT USED LAYNE-WESTEN FAILING 2500
6 3/4 DIAMOND BIT, ROTORY/AIR
LOGGED BY W. R. Lund

(S.A.) 10/24

P. 36

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	~~Blows or Force~~ RQD	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						hard, local petroliferous zones, hrz.	
						parting planes at 508.5 (possable 5-10° dip),	
						509.2', 510.2, and 510.9, faces smooth & clean	
						except in petroliferous zones - rough w/	
						minor coatings.	
5111-524.6		16	3" CORE	100	100	Claystone - shale; grayish brn. 5YR 3/2, dusky	
						brown 5YR 2/2 to pale brown 5YR 5/2, 90%	
						clay or v. fine silt, well sorted, slt. to mod.	
						calc., laminated - generally indistinct, locally	
						differential compaction evident, rock has	
						a slt. petroliferous odor w/ local increases	
						in oil content, occ. bitumenous (tar like)	
						material found on parting planes, hard,	
						excellent core recovey, parting planes	
						at 512.8, 514.3, 515.2, 515.9, 517.6	
						518.5 and 522.8 - faces generally are	
						smoot and clean (polished), most parting	
						planes corespond to local increases in	
						petrolium content.	
524.6-524.7		16	3" CORE	100	100	Mudstone (Marlstone?); mod. brown 5YR 3/1	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068　BORING NO. P-3

DATE 10/24/74 TITLE SUN-PHILLPS-SOHIO　ELEVATION ______ DATUM ______

START ______ COMPLETE ______　WATER LEVEL ______ AFTER ______

EQUIPMENT USED LAYNE-WESTERN FAILING 2500　LOGGED BY W.R. Lund

6 3/4 DIAMOND BIT, ROTORY/AIR　P. 37

S.A. 10/24

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						mixture of clay, silt, & v. fine rounded	
						sand qtz, poorly sorted, slt. to mod.	
						calc., v. thinly laminated, soft-can	
						dig with fingernail, hrz parting	
						plane w/ a clean irregular surface marks	
	WRL					upper contact	
531.5 524.7-~~[illegible]~~		16	3" CORE	100	100	Claystone-Petroliferous Claystone (Shale);	
						grayish red 5R 4/2 to blk. N-1, 90%+ grains	
						clay or v. fine silt, mod. to well sorted,	
						slt. calc. to locally mod. calc., laminated-	
						generally indistinct, local increases	
						in petroleum content 527.2-527.3 v. high,	
						occ. tar like bitumenous material found on	
						parting planes, rock has slt. to mod. petroliferous	
						odor - more so than rock above mudstone	
						interbed - but still not real strong, hrz.	
						parting planes at 524.7, 526.2, 526.5,	
	WRL					527.3, 527.8, 529.0, 530.2	
531.5 - 535.2 ~~[illegible]~~ - ~~[illegible]~~2		17	3" CORE	100	100	Silty Claystone-Shale; dusky brown 5YR	
						4/2, 90%+ clay and silt size material	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-3

DATE 10/24/74 TITLE SUN-PHILLIPS - SOHIO

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED LAYNE-WESTERN FAILING 2500
6 3/4" DIAMOND BIT, AIR/ROTORY

LOGGED BY W.R. Lund

P.38

(S.A) 10/24

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						silt varies from 5-15% or more locally,	
						mod. to poor sorting, mod. calc., laminated generally	
						indistinct though locally v. apparant, slt.	
						petroliferous w/ isolated thin horizons	
						of somewhat higher $\overset{\text{sp?}}{\text{petalieum}}$ content,	
						hard and brittle, hrz. parting plane at	
						532.7, 533.9, 535.3, 536.6, 538.0, 538.6,	
						539.9, 541.0, and 541.5, parting plane	
						faces smooth w/ hackly fracture around	
						edges - some local v. lt. calcite coatings.	
						Either v. fine mica or diseminated pyrite	
WRL						present	
545.2 -546.5		17	3" CORE	100	100	Petroliferous shale; grayish brown 5YR 3/2	
						to blk N-1, 90% + silt or below, well	
						sorted, mod. calc., laminated - well dev.,	
						pinch & swell structures abundant, strong	
						petroliferous odor, hard and brittle, hrz.	
						pp. at 546.4 - face smooth w/ minor	
						calcite coating.	
546.5-551.6		17	3" CORE	100	100	Silty Claystone - Shale; v. dusky red 10R 2/2	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/22/74 TITLE SUN-PHILLPS-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED LAYNE-WESTERN FAILING 1500
6 3/4" DIAMOND BIT, ROTORY/AIR
LOGGED BY W. R. Lund
P.39

5.1 10/24

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						to dusky brown 5YR 2/2, 15-20% silt-80-85%	
						clay, poor to mod. sorted, mod. calc., lam-	
						inated- generally indistinct, slt. petro-	
						liferous w/ occ. specks of bitumenous	
						material on fresh surfaces, hard & brittle,	
						hrz. parting planes at 547.6, 548.8, 549.6,	
						550.8	
551.6-552.9		17	3" CORE	100	100	Petroliferous Shale; dk. yellowish brn 10YR	4/2
						to blk N-1, 90% silt or clay size,	
						well sorted, noncalc. to v. slt. calc., laminated-	
						well dev., v. strong petroliferous odor, abun-	
						dant bitumenous material, hard, hrz. parting	
						plane at 552.2	
552.9-554.0		17	3" CORE	100	100	Silty Claystone; dusky brn. 5YR 2/2, 15-20%	
						silt 80-85% clay, poor to mod. sorting,	
						mod. calc. to calc, laminated-gen. indistinct	
						hrz. pp. at 553.7, slt. petroliferous	
554.0-557.2		17	3" CORE	100	100	Siltstone, dusky brn. 5YR 2/2, v. fine to	
						coarse silt w/ unknown ? 10% clay content,	
						poorly sorted, laminated to v. thinly bedded,	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068 BORING NO. P-3

DATE 10/24/74 TITLE SUN - PHILLPS - SOHIO ELEVATION ______ DATUM ______

START ______ COMPLETE ______ WATER LEVEL ______ AFTER ______

EQUIPMENT USED CAYNE-WESTERN FAILING 2500 LOGGED BY W.R. LUND

(S.A.) 10/24 40

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						mod. calc., hard-resistant, non fractured	
557.2-						Silty Claystone; -Siltstone WRL dusky brn. 5YR$^2/_2$ to	
						v. dusky red 10R$^2/_2$, silt-clay ratio	
						highly variable - gen. 30:70 but locally	
						40:60 or possibly 50:50, calc. bedding	
						indistinct, hard, hrz. parting planes	
						at 558.0 & 559.3 - smooth & clean.	587.25
						and at 562.75, 564.15 579.57,	580.61.
561.		10		89	99	Continuation of lithology some	570.42 571.14
						dusky yellowish brown 10YR$^2/_2$	
						bedding faint but where seen	
						is laminated. silt content	
						generally around 25%, some	
						slightly higher zones, slightly	
						calcareous to moderatley	
						calcareous, some nachclite and	
						very small amount of pyrite,	
						some ~~moderate~~ oil content. Tuff	
						Sandstone occurs at 568.5	
						(.05' Thick), 575.5 (.1') 576.4 (.1')	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/25/74 TITLE SUN-PHILLPS-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED LAYNE-WESTERN FAILING 2500 6 3/4" DIAMOND BIT, ROTORY/AIR
LOGGED BY W. R. Lund

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S.A. 10/25

DEPTH	SAMPLES			RQD Blows or Force		DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type		Recovery, Condition		
						586.3 (.05), and some under .01	
						scattered through section.	
						~~[illegible]~~ tuff is ≈ pale yellowish	
						brown (10YR 8/2) hard, fine to	
						medium grain, moderate sorting,	
						slightly calcareous, massive,	
						some contain oil. Claystone	
						is very homogeneous, it is ‖	
						non-fossiliferous, ~~[illegible]~~	
W.R. LUND	10	25	74			non-fracture	
591-596.1		18/19	3" CORE	100	100	Silty ~~Sta~~ Claystone-Shale; v. dusky	
						red 10R 2/2 to dusky brown 5YR 2/2, 10-15%	
						silt - 85-90% clay, poor to med. sortinging,	
						med calc., laminated - well dev. & regular,	
						hard, hz. parting planes at 591.4, 592.0 ([illegible] 5°)	
						594.0, 595.6, faces smooth to sltly irreg. -	
						clean	
596.1-597.2		19	3" CORE	100	100	Argillaceous Siltstone; blkish red 5R 2/2	
						to v. dusky red 10R 2/2, v fine to coarse	
						silt and >10% clay, poorly sorted, slt to	

NOTES: DCH 10-25

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. ~~[illegible]~~ P-3
DATE 10/25/74 TITLE SON-PHILLPS-SOHIO
ELEVATION ____ DATUM ____
START ____ COMPLETE ____
WATER LEVEL ____ AFTER ____
EQUIPMENT USED LAYNE-WESTERN FAILING 2500
6 3/4" DIAMOND BIT, AIR/ROTORY
LOGGED BY W. R. LUND

42

S.A. 10/25

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows/Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
621.0						mod. calc., hard, nonfrac.	
~~[illegible]~~0 597.2 - ~~[illegible]~~0		19	3" CORE	95-97%	100	Silty Claystone - Argillaceous Siltstone =	
						shale; v. dusky red 10R 2/2 to grayish	
						red 5R 4/2 to locally black, mixture of	
						silt and clay - variable - rock is borderline	
						and probably should simply be refered	
						to as shale, poorly sorted, mod. calc.	
						to calc., laminated to v. thinly	
						bedded, sltly to med. petroliferous	RCH
						w/ isolated thin horizons of higher	10-25
						petroleum content, hard & tough,	
						parting planes at 598.6', 599.6, 599.9	
						601.3, 602.8, 604.7, 605.7, 606.6, 609.0,	
						610.6, 612.5, 613.3, 613.6, 613.9, 614.4, 615.2	
						615.7, 616.6, 617.3, 617.5, 617.9, 618.4, 619.3	
						many of these planes correspond to horizons	
						of petroleum enrichment, faces are	
						smooth to slt. rough and clean; rock	
						is v. homogeneous throughout - not even	
						an occasional thin tuff stringer.	

NOTES: RCH 10-25

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-3

DATE 10/25/74 TITLE SUN-PHILLPS-SOHIO

ELEVATION ____ DATUM ____

START ____ COMPLETE ____

WATER LEVEL ____ AFTER ____

EQUIPMENT USED FAILING 2500 - LAYNE-WESTERN
6 3/4" DIAMOND BIT, AIR/ROTORY

LOGGED BY W.R. Lund

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
621.0-625.6		20	3" CORE	100%	100%	Petroliferous Silty Claystone-Shale; blkish	
						red 5R 2/2 to brnish blk 5YR 2/1, silt-	
						clay ratio difficult to estimate due to	
						presance of abundant v. fine flks of bit-	
						uminous material, poor to mod. sorting,	
						noncalc. to v. sltly calc., laminated-v.	
						well dev., pinch and swell structures	
						abundant, hard-brittle, parting planes	
						at 621.2, 622.2, 623.0, 623.4, 624.9'-	
						faces are smooth and clean w/no coatings-	
						most correspond to local increases in	
						bitumen content.	
625.6-634.1		20	3" CORE	100%	100%	Silty Claystone-Shale; blkish red 5R 2/2	
						to grayish brown 5YR 3/2, clay and silt	
						size material with clay predominating,	
						poorly sorted, v. sltly. calc. to mod	
						calc., laminated-well dev. c̄ regular	
						only occ. pinch and swell structures,	
						fresh surface has speckled appearance - reflecting	
						planes on v. fine graind bitumenous material	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 11/25/74 TITLE SUN-PHILLIPS-SOHIO
START ______ COMPLETE ______
EQUIPMENT USED LAYNE-WESTERN FAILING 2500
6 3/4" DIAMOND Bit, Rotary/Air

BORING NO. P-3
ELEVATION ______ DATUM ______
WATER LEVEL ______ AFTER ______
LOGGED BY W. R. Lund

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						parting planes at 626.8, 627.9, 629.4, 630.6,	
						and 633.9'; v. thin (<.05') tuff horizons w/in this	
						horizon, parting planes commonly dev. along them.	
634.1-635.2		20	3" CORE	100%	100%	Petroliferous Claystone (Oil Shale); dusky	
						brn. 5YR 2/2 to brnish blk 5YR 2/1, clay & silt	
						size material, slt. to mod. calc., slt. to mod.	
						calc., laminated, v. well dev., .05' thick	
						bitumenous rich tuff zone at 633.5 - lower	
						contact wavey (differential compaction) hard, nonfrac.	
635.2-647.1		20	3" CORE	100%	100%	Silty Claystone-shale; med. dk. gray N-4 to olive	
						gray 5Y 4/1 or olive blk. 5Y 2/1, clay & silt size	
						ratio varies but clay > silt, poor to mod.	
						sorting, laminated, well dev. & regular,	
						v. slt. calc., local increases in petroleum	
						content - gen <.05' in width & isolated, slt.	
						petroliferous odor, thin (<.05') tuffaceous	
						horizons occ. locally, parting planes at	
						637.5' 638.7', 640.5', 641.7', 642.0', 645.2' -	
						faces clean & smooth	

NOTES:

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-3

DATE 10/25/74 TITLE

ELEVATION

DATUM

START

COMPLETE

WATER LEVEL

AFTER

EQUIPMENT USED LAYNE-WESTERN, FAILING 2500
6 3/4" DIAMOND BIT, ROTORY AIR

LOGGED BY W. R. Lund

45

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
647.1 - 648.1		20	3" CORE	100	100	Petroliferous Claystone; (Oil Shale); dusky	
						brn. 5YR 4/2 to blk N-1, clay and silt	
						size material - clay predominates, mod to well	
						sorted, noncalc. to v. sltly calc., laminated	
						well dev. - v. regular - occ. v. thin (±.01')	
						tuffaceous zones	
648.1 - 655.28		20/21	3" CORE	100	100	Silty Claystone-Shale; dk. gray N-4, silt & clay	
						w/clay predominate (gen. 30:70 to 15:85)	
						mod. to poor sorting, noncalc. to v. slt. calc.,	
						laminated - indistinct, hard, hrz. parting	
						planes at 648.1 and 649.7' - faces	
						smooth to slty irregular, at 653.4'	
						stringers of tuff sandstone .01" thick	
M. Siembiedy		21		100	100	Oil "Shale"; dusky yellowish brn. 10YR 2/2	
655.28 -						v. hard, small percentage of silt (20-10),	
655.79						v. sltly calc., laminated, poorly sorted,	
						nonfractured, moderate oil content	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068 BORING NO. P-3

DATE 10/25/75 TITLE ELEVATION DATUM

START COMPLETE WATER LEVEL AFTER

EQUIPMENT USED L-W Air Rotary Failing 2500 LOGGED BY M Siembieda

46

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
655.79 -		21		100	100	Silty claystone: dusky	
661.42						brown (5YR 2/2) hard, laminated	
						silt comprises ≈30-40%, slightly	
						calcareous to moderatley	
						calcareous, poorly sorted	
						Non-fractured, Non-fossiliferous	
						No Parting Planes, very homogeneous.	
						At 658.43 and 658.9 Sandstone	
						tuffs, hard, Non-calcareous, irregular	
						contact with claystone	
661.42		21		100	100	"Oil shale": dusky yellowish	
662.20						brown (10YR 2/2) very hard	
						laminated, silt content ≈20%	
						slightly calcareous, moderate	
						oil content, non-fractured	
						non-fossiliferous, some	
						small crystals of pyrite	
662.20				100	100	Silty Claystone: brownish gray	
667.62						(5YR 3/1) hard, silt content	
						≈40%, laminated, moderatley	

NOTES: s.H. 10/25

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-3

DATE 10/25/75 TITLE

ELEVATION DATUM

START COMPLETE

WATER LEVEL AFTER

EQUIPMENT USED L-W Air Rotary Failing 2500

LOGGED BY M Siembieda

47

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
~~[illegible]~~		21				calcareous, ~~som~~ poorly sorted	
662.20						some very fine pyrite crystals	
667.62 cont						non-fossiliferous non-fractured	
						very homogeneus	
667.62		21		106	100	Sandstone tuff, hard	
667.72						moderatley calcareous, medium	
						to fine grained	
667.72		21		100	100	"Oil shale" dusky yellowish	
668.65						brown (10 YR 2/2) to grayish black	
						(N2) very hard, laminated	
						silt content 30-40%, non-calcareous	
						to slightly calcareous, moderate	
						oil content, some slight	
						differential compaction at	
						upper contact	
668.65		21		99 ~~100~~	100	Silty Claystone olive grey	
680.1						(5Y 4/1) to dusky yellowish brown	
						(10 YR 2/2) hard to very hard	
						silt content ≈ 25% (±10%)	
						laminated, slightly calcareous	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-3

DATE 10/25/74 TITLE

ELEVATION DATUM

START COMPLETE

WATER LEVEL AFTER

EQUIPMENT USED L-10 Air Rotary Failing 2500

LOGGED BY M. Siembieda

48

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
→		21				poorly sorted, some fine-grained	
680.10						pyrite. non fossiliferous, non	
cont						fractured. very homogeneous.	
						possible thin stringers of nahcolite	
						Tuff sandstone at	
						668.9 (.15' Thick) 675.92 →	
						676.12, 677.65 → 677.83,	
						677.35 (0.5 thick) hard	
						fine to medium-grained, non	
						calcareous to very slightly calcareous	
						moderate to high oil content	
						irregular contacts with claystone	
680.10 →		22		100	100	"Oil shale" dusky brown	
683.10						(5YR 2/2) hard to very hard	
						laminated, low percentage of	
						silt ≈15%, slightly calcareous	
						fine-grained pyrite crystals	
						moderate to low oil content	
						non-fossiliferous, non fractured	

NOTES: S.H. 10/25

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/25/74 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED L-W Air Rotary
LOGGED BY M Siembieda

49

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
683.10		22	core	100	100	silty Claystone: dusky brown	
686.44						5YR 2/2 hard, laminated, silt content	
						≈ 30% ± 10% very slightly calcareous	poorly sorted
						non-fossiliferous non Fractured	
						Parting plane at 685.14, slight	
						amount of oil, homogeneous	
686.44		22	1	100	100	Oil shale dusky brown 5YR 2/2 (?)	
687.00						hard to Very hard, laminated	
						moderate to low oil content	
						sharp contacts, color slightly	
						darker	
687.00 →		22		100	100	silty Clay stone: dusky brown	
691.54						5YR 2/2 to dusky yellowish brown	
						10YR 2/2, hard to Very hard	
						laminated (bedding faint), silt	
						content 30% → 40%, slightly	
						calcareous, Non. fossiliferous	
						non-fractured, fine pyrite crystals	
						Parting plane at 689.75. Sandstone	
						tuff 689.60 → 689.75, fine to	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-3

DATE 10/25/74 TITLE

ELEVATION DATUM

START COMPLETE

WATER LEVEL AFTER

EQUIPMENT USED L-W Air Rotary Failing 2500

LOGGED BY M. Siembieda

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47

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
cont		22				medium grained, moderate sorting	
						slightly calcareous, H_2S gas	
						porous, some oil	
691.54		22		100	100	Sandstone tuff: dusky yellowish	
692.42						brown (10YR 2/2) hard to very	
						hard, fine to medium grained	
						some interbedded claystone	
						otherwise massive, moderate	
						sorting, NON-calcareous	
						possible vertical fracture	
						some H_2S gas	
692.42		22		100	100	Silty Claystone: Grayish brown	
						(5YR 3/2) to brownish gray (5YR 4/1)	
						hard, laminated (faint bedding)	
						silt content 20%-50% generally	
						25%, slightly calcareous, some	
						pyrite crystals and gilsonite.	
						sealed vertical fractures	
						throughout section, parting	
						planes at 696.20, 698.15	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/25/75 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED L-W Air Rotary Failing 2500
LOGGED BY M. Siemhieda

S.A. 10/26

50a

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
cont''		22	~~22~~	~~22~~		699.86 702.80 709.80.	
				100	100	non-fossiliferous, lithology	
						very homogeneous. Sandstone	
						tuffs at 695.00→695.17	
						674.62-699.97, 700.66 (.02" thick)	
						between 702.45 and 703 several	
						small stringers, 707.34→707.47	
						708.7→709.4, hard to very	
						hard, fine to medium grain,	
						non-calcareous to very slightly	
						calcareous, porous, H_2S gas	
						present, some oil content	
10/26/79 W. R. Lund							
710.0-712.28		22/23	3½" CORE	100	100	Silty Claystone-shale; dk. reddish brn.	
						10R3/4 to dusky brown 5YR2/2, silt-clay	
						mixture ≈ 25-75, poorly sorted, laminated-	
						well dev. & regular, mod calc. to calc.,	
						hard, slt. petroliferous but w/ increasing	
						oil content w/ depth, hrz. parting	
						plane with smooth clean surface, at 710.77	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068		BORING NO. P-3	
DATE 10/26/74	TITLE SUN-PHILLIPS-SOHIO	ELEVATION	DATUM
START	COMPLETE	WATER LEVEL	AFTER
EQUIPMENT USED L-W FAILING 2500 6¾" DIAMOND Bit, Rotary/Air		LOGGED BY W.R. Lund	

51

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						a thin < .05' bitumenous rich tuff	
						zone - blk N-1.	
712.28 - 712.61		23	3½" CORE	100	100	Interbedded Bitumenous Tuff & Petrolifer-	
						ous Claystone; blk N-1 to dusky brown	
						5YR 2/2, predominantly silt & clay size	
						w/occ. sand grains, poor to med. sorting,	
						med. calc. to calc., hard, nonfractured, upper	
						and lower contacts irregular.	
712.61 - 714.15		23	3½" CORE	80%	80%	Silty Claystone - Shale; dusky brn 5YR 2/2	
						to v. dusky red 10R 2/2, 20-30% silt,	
						poorly sorted, calc., laminated, sltly. to	
						med. petroliferous, irregular - rough parting	
						plane at 713.00 - .33' NR assigned here.	
714.15 - 715.34		23	3½ CORE	100%	100%	Petroliferous Claystone "Oil Shale", blk N-1	
						to med. brown 5YR 4/4 (tuffaceous layers),	
						10-15% silt, med. to well sorted, calc.,	
						laminated - well dev., hard, strong pet-	
						roliferous odor; irregular parting plane at	
						714.49', occ. v. thin bitumenous tuffaceous zones -	
						lower contact bounded by an especially rich zone	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-3

DATE 10/26/74 TITLE SUN-PHILLPS-SOHIO

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED L-W FAILING 2500, 6¾
DIAMOND Bit, ROTORY/AIR

LOGGED BY WRL

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S.A. 10/26

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
715.34-720.1'		23	3½ CORE	100	100	Silty Claystone - Shale; grayish brown	
						$5YR^{3/2}$, clay silt mixture - ratios	
						difficult to determine due to abundance	
						of finly disseminated bitumenous material - which	
						give fresh faces a "sparkely" appearance,	
						poorly sorted, med. to slt. calc. - decreasing	
						w/depth - also w/depth get the appearance	
						of relatively large .01-.02' dia. blebs of	
						bitumenous material, laminated, hard,	
						slt. to mod. petroliferous odor, 717.20-717.35	
						bitumenous rich tuffaceous horizon, hrz.	
						parting planes at 717.20, 718.5, faces irregular -	
						clean.	
720.1-721.30		23	3½ CORE	100	100	Petroliferous Claystone - "Oil Shale" blk N-1	
						to v. dusky red $10R^{2/2}$, 10-15% silt, poor to	
						med. sorted, slt. to mod. calc., laminated - well	
						developed, med. to strong petroliferous odor,	
						hard, hrz. parting plane at 720.6	
721.30-723.20		23	3½ CORE	100	100	Silty Claystone - Shale; grayish brn $5YR^{3/2}$	
						clay & silt - clay predominates, poorly sorted	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/26/74 TITLE SUN-PHILLIPS - SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED L-W FAILING 2500, 6 3/4" DIAMOND Bit, ROTORY/AIR
LOGGED BY W. R. Lund

P 53

RQD

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
						slt. to mod. calc, laminated, hard, non frac	
723.20 - 724.6		23	3 1/2 CORE	65% ~~100~~	100	Petroliferous Claystone "Oil Shale" blk N-1	
						to dusky brn. 5YR 2/2, 10-15% silt, poor to	
						med. sorted, med calc. to calc, laminated,	
						med. to strong petroliferous odor, hard, irregular	
						surfaced parting planes at 723.35 & 723.45 -	
						appear to coincide w/ a tuffaceous zone	
724.6 - 726.85		23	3 1/2 CORE	100	100	Silty Claystone - Shale; med. brn. 5YR 3/4,	
						15-30% silty, poorly sorted, med calc,	
						laminated, slt. petroliferous, non frac.	
726.85 - 728.5		23	3 1/2 CORE	100	100	Siliceous Tuff; lt. brn 5YR 5/6 to lt. gray N-7,	
						med to coarse grained qtz. sand w/ v. fine	
	Note: Upper wavy horizon.					mafics, shapes & sizes difficult to determine	
						due to siliceous cement - mafics possibly	
						biotite, slt. calc, bedding v. irregular	
						and wavy, very hard, irregular surfaced	
						parting planes at 727.3 & 727.7; upper & lower	
						contacts v. sharp - sltly wavy	
728.5 - 731.1						Silty Claystone - Shale; med brn. 5YR 3/4,	
						10-25% silt, poor to med. sorting, slt. to	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-3

DATE 10/26/74 TITLE SUN-PHILLPS-SOHIO

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED L-W FAILING 2500, 6 3/4 DIAMOND BIT, ROTORY/AIR

LOGGED BY W.R.L.

P.54

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						med. calc, hard, nonfractured, .05'	
						bituminous tuff horizon at 730.4	
731.1'-731.5		23	3½ CORE	100	100	Petroliferous Claystone; blk N-1, 10-15% silt,	
						poor to moderately sorted, calc., laminated,	
						nonfrac.	
731.5-741.7		23/24	3½ CORE	100	100	Silty Claystone-Shale; brnish gray 5YR 4/1 to	
						v. dusky red 10R 2/2, silt 20-30% locally	
						40%, poorly sorted, laminated - well dev.	
						to indistinct, slt. calc., sltly to medly.	
						petroliferous, hard, hrz. parting planes	
						at 735.1'; 736.1'; 738.3, 739.8, local	
						thin zones of increased petroleum	
						content becoming more numerous with	
						depth until grades to oil shale	
741.7-743.6		24	3½ CORE	100	100	Petroliferous Claystone "Oil Shale; blk	
						N-1 to v. dusky red 10R 2/2, approx 5-10%	
						silt, well sorted, noncalc to locally v.	
						sltly calc (individual laminae), laminated;	
						well dev., mod. to strong petroliferous	
						odor, hard, hrz. parting planes at 741.95'	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/26/74 TITLE SUN-PHILLPS-SOHIC
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED L-W FAILING 2500, 6 3/4 DIAMOND Bit, Rotary/Air
LOGGED BY W. R. Lund

P.55

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						742.7, 743.3, faces are smooth to sltly	
						irregular - locally sltly coated with	
						$CaCO_3$.	
743.6-745.3		24	3½ CORE	100	100	Siltstone; pale yellowish brown 10YR 6/2	
						to grayish brown 5YR 3/2, alternating	
						coarse and fine laminae (fine laminae	
						may actually be a silty claystone), clay	
						to v. fine sand w/ silt predominant,	
						silt and sand consist of rounded qtz. and	
						v. fine grained tuffaceous? material, poor	
						to med. sorted, mod calc. to calc., laminated;	
						v. well developed, hard, nonfractured	
745.3-751.6		24	3½ CORE	100	100	Petroliferous Claystone "Oil Shale"; blk	
						N-1, to dusky brn. 5YR 2/2, 10-20%	
						silt, poor to well sorted, mod. calc., laminated-well dev. med	
						to strong petroliferous odor, hard, parting	
						planes 746.6, 749.8, smooth & clean - show	
						the effects of polishing.	
751.6-756.4		24	3½ CORE	100	100	Silty Claystone - "Borderline Oil Shale";	
						dusky yellowish brn. 10YR 2/2, 10-15% silt,	

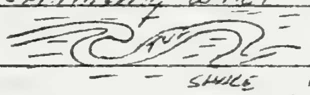
NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/26/74 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED L-W FAILING 2500 6 3/4" DIAMOND Bit, Rotary/AIR
LOGGED BY W.R. Lund

P. 56

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						mod to well sorted, mod. calc., laminated -	
						well dev. slt to mod petroliferous - rock	
						has > oil content than the silty claystones	
						described above - but generally less than	
						what I have been calling oil shale - rx. is	
						borderline and could be classed either	
						way, hard, hrz parting planes at 752.3',	
						753.75,	
756.4-758.7		24	3½ CORE	100	100	Petroliferous Claystone "Oil Shale", blk N-1	
						to dusky brown 5YR $^{2}/_{2}$, ±10% silt, well	
						sorted, mod calc. to calc., laminated - well	
						dev. local evidence of differential compaction	
						occ. in thin (.01'-.02') tuffaceous zones	
						exhibiting what appear to be roll structures	
						, hard, nonfractured	
758.7-761.1		24	Core 3½	100	100	Interbedded Petroliferous Claystone and	
						Tuffaceous ~~Silts~~ Claystone; blk N-1 to pale yellowish	
						brown 10YR $^{6}/_{2}$, 10-30% silt varying w/ location, poor	
						to well sorted, calc., laminated to thinly	
						bedded, well dev., appears to be a	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/16/74 TITLE SOH-PHILLPS - SOHIO
ELEVATION ____ DATUM ____
START ____ COMPLETE ____
WATER LEVEL ____ AFTER ____
EQUIPMENT USED L-W FAILING 2500, 6 3/4" DIAMOND Bit, Rotory/Air
LOGGED BY W.R. Lund

67

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						transition zone from the oil shale to the	
						tuft sequence which follows, hrz. parting	
761.						planes at 759.1, 759.7, 760.5 - clean &	
						smooth - polished.	
761.1 - 767.8		24	3½ CORE	91.5	91.5	Tuffaceous Siltstone (grading locally to	
						a Tuffaceous Claystone); grayish orange	
						pink 5YR 7/2 to med. brn. 5YR 3/4, basicly	
						silt w/ local increases in clay - occ. fine	
						to med. sand - mostly subrounded to rounded	
						qtz, poor to well sorted, calc. to v. calc.,	
						laminated to thinly bedded, mod. hard,	
						hrz. parting planes at 762.05, 762.9,	
						764.4, 765.05, 765.5, 766.6, 767.55, faces some lt to slt. buckly, isolated	
						thin areas of mod. oil content, parting	
						plane at 765.5 thickly coated w/ a	
						soft, white, massive mineral - fizzes sltly	
						but appears to be due to secondary calcite,	
767.8 -		24	3½ Core	100	100	Silty Claystone; lt. gray N-6 w/ occ. laminae	
776.15		+				lt brnish grey 5YR 4/1, up to 40% + silt,	
		25				poorly sorted, noncalc., laminated - v. well	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/26/74 TITLE SUN-PHILLIPS-SCHR
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED L-10 FAILING 2500, 6¾" DIAMOND Bit, Rotory/Air
LOGGED BY Lund/siembieda

58

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
→		25		100	100	dev., non petroliferous to only v. sltly petro-	
776.15						liferous, hard, hrz parting planes at 767.5,	
cont'						768.5, 769.2, and 770.2, smooth to hackly	
						fracture - some show effects of polishing	
						Additional planes at 771.48	
						773.28	
776.15		25		100	100	"oil shale" Olive black (5Y 2/1)	
777.08						hard to very hard, thinly	
						laminated, low silt % under	
						10%, very slightly calcareous	
						poorly sorted, some thin	
						tuff beds, minor distortion	
						of bedding due to differential	
						compaction, Non-fractured	
						NON-Fossiliferous	
777.08		25		100	100	Siltstone: Pale brown (5YR 5/2)	
780.85						hard, thinly bedded,	
						predominantly silt some clay	
						size Particles (≈15%), poorly	
						Sorted, slightly calcareous	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. ~~74-068~~ P-3
DATE 10/26/74 TITLE
ELEVATION
DATUM
START
COMPLETE
WATER LEVEL
AFTER
EQUIPMENT USED L-W Air Rotary Failing 2500
LOGGED BY M. Siembieda

P. 59

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
→ 780.85		28				some interbedded tuFFs,	
cont						that are porous, H_2S gas	
						present, ~~thing~~ generally	
						thin, with some .08 near	
						botton contact, parting	
						planes at 777.58, 778.12	
						779.29, 780.05, non Fossiliferous	
						Non-fractured	
780.85		28		100	100	"Oil shale" (silty claystone)	
786.77						Grayish brown (5YR 3/2) to dusky	
						brown (5YR 2/2) hard to	
						very hard, thinly laminated	
						silt content ≈ 30% ± 10%	
						poorly sorted, some fine-grains of pyrite, slightly	
						calcareous. Low oil content	
						to moderate oil content	
						some welded vertical fractures	
						parting planes at 781.20,	
						781.50, 782.43 786.64	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-3

DATE 10/26/74 TITLE

ELEVATION

DATUM

START

COMPLETE

WATER LEVEL

AFTER

EQUIPMENT USED LW Air Rotary Failing 2500

LOGGED BY M Siembieda

P.60

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
786.77		28				Tuff sandstone beds at	
cont						781.56 → 781.75, 781.85 (.05-.10	
						thick) 782.2 - 782.3, hard	
						fine to medium grain, porous	
						high oil content, massive	
786.77		28		100	100	Siltstone: dark yellowish	
799.88						brown 10YR 4/2 dusky brown	
						5YR 2/2, medium light grey	
						(N6) hard, laminated, grain	
						size varies from fine sands	
						to clay size, well sorted,	
						Non-calcareous to slightly	
						calcareous, with dolomite	
						occuring, grains of pyrite,	
						and stringers of gilsonite	
						some tuff in siltstone, Parting	
						planes at 796.36, 798.15	
						799.78. Occuring between	
						795.60 and 796.05, Tuffaceous	
						sandstone breccia, hard	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74- 068 BORING NO. P-3

DATE 10/26/74 TITLE ELEVATION DATUM

START COMPLETE WATER LEVEL AFTER

EQUIPMENT USED L-W Air Rotary Failing 2500 LOGGED BY M Siembieda

P 60

S.A. 10/26

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
799.88		28				grain size varies greatly	
cont						from fine sands to blocks	
						of tuff over 2' ACROSS.	
						Massive, very well sorted	
						locally calcareous, dolomitic	
						some calcite crystals (in	
						Voids), non-fossiliferous,	
						porous, some vertical	
						fractures. Tuff grains seen	
						to "Float" in sandstone ground	
						mass. H_2S gas present.	
						very destinctive zone (probably	
						~~[illegible]~~)	
799.88 >		29				Oil shale: grayish black (N2)	very
800.80						hard, thinly laminated, very	
						low silt < 10%, non calcareous	
						poorly sorted, non-fractured	
						moderate oil content	
						some very thin tuff bed	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/26/27/74 TITLE SUN-PHILLPS-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED L-W FAILING 2500, 6¾" DIAMOND BIT, ROTORY/AIR
LOGGED BY M. Siembeda | 805.8 & W. R. Lund | 805.8-
61

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
80[illegible]80		24		100	100	Siltstone, moderate brown	
805.80						(5YR 3/4) to dusky brown 5YR 2/2.	
						hard to very hard thinly	
						laminated, moderate sorting	
						(some clay particle 30% ±10%)	
						Non-calcareous to slightly calcareous	
						very low oil content. Parting	
						planes at 803.34, 804.14	
						805.33. At bottom contain	
						Sandstone lenses hard	
						grey, porous medium-grain	
10/27/74		W. R. Lund					
805.80-806.2						Petroliferous Claystone; "Oil Shale", blk	
						N-1 to brnish blk 5YR 2/1, silt & clay w/	
						clay predominante - ratio difficult to deter-	
						mine due to abundance of bituminous	
						material, poor to med. sorted, noncalc.,	
						thinly laminated - well dev., hard, non	
						frac, strong petroliferous odor	
806.2-806.63						Tuffaceous Silty Claystone; grayish orange 10YR 7/4	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068

DATE 10/27/74 TITLE SUN-PHILLPS-SOHIO

START ______ COMPLETE ______

EQUIPMENT USED L-10 FAILING 2500 6 3/4" DIAMOND BIT, ROTORY/AIR

BORING NO. P-3

ELEVATION ______ DATUM ______

WATER LEVEL ______ AFTER ______

LOGGED BY W.R. LUND

62

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						to locally brnish blk. 5YR 2/1, silt-clay	
						40:60 to 50:50, poorly sorted, noncalc.	
						to slt. calc., thinly laminated, hard,	
						nonfrac, sltly. petroliferous.	
806.63 - 811.27			3 1/2" CORE	100	100	Petroliferous Claystone - Siltstone "Oil Shale",	
						blk N-1 to ~~grayish~~ brnish blk 5YR 2/1 w/ isolated	
						thin stringers grayish orange 10YR 7/4, abundance	
						of bitumenous material makes it difficult	
						to determine if rock is claystone or silt-	
						stone - definitly somewhat tuffaceous,	
						poorly sorted, noncalc. to v. sltly calc.,	
						laminated - well dev., ~~faint~~ strong petroliferous odor,	
						hard, parting planes at 807.32, smooth	
						to sltly irregular - coated w/ bituminous	
						material, between 808.16 and 808.9 are	
						5 thin (widest = .06') tuff zones w/	
						much lower petroleum content - the	
						shales around them have the highest	
						oil content of this interval.	
811.27 - 811.55			3 1/2" CORE	100	100	Petroliferous Siltstone - "Borderline Oil Shale"	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/27/74 TITLE SUN-PHILLPS-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED C-W FAILING 2500, 6¾" DIAMOND BIT, ROTORY/AIR
LOGGED BY W. R. Lund

63

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						grayish brown 5YR 3/2 to grayish red 5R 4/2,	
						silt & clay w/ silt predominate (somewhat	
						tuffaceous), poorly sorted, calc., laminated	
						hard, nonfractured.	
811.55-812.90			5½	75%	100	Petroliferous Claystone - Siltstone "Oil Shale";	
						Blk N-1 to blkish red 5R 2/2, silt & clay	
Possable Mahogany Bed: E. Crangham						material ratio difficult to estimate due	
						to abundant bitumenous material, poor to	
						mod. sorting, noncalc., thinly laminated -	
						well dev., strong petroliferous odor, hard,	
						brz parting planes at 812.9 - v. irregular	
						along contact w/ tuff zone (material somewhat tuffaceous)	
812.9-813.05			5½ CORE	100	100	Petroliferous Tuff; pale brn. 5YR 5/2 to dusky	
						brown 5YR 2/2, v. fine to med grained,	
						poorly sorted, siliceous cement - makes	
						indiv. grain identification difficult, poorly	
						sorted, noncalc. to slt. calc. bedding v.	
						contorted - roll structures, v. hard	
813.05-814.20						Petroliferous Claystone - "Oil Shale"; dusky	
						brown 5YR 2/2 to grayish brown 5YR 3/2; silt	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068

DATE 10/27/74 TITLE SUN-PHILLPS-SOHIO

START _____ COMPLETE _____

EQUIPMENT USED L-W FAILING 2500, 6¾" DIAMOND BIT, ROTORY/AIR

BORING NO. P-3

ELEVATION _____ DATUM _____

WATER LEVEL _____ AFTER _____

LOGGED BY W.R. Lund

64

DEPTH	SAMPLES			RQD Blows or Force	Recovery, Condition	DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type				
						≈10-15%, mod. to well sorted, calc., lam-	
						inated - well dev., mod. petroliferous odor	
						decreasing to slt. odor w/ depth - this	
						zone appears to be a transition area	
						from rich oil content above to marginal content	
						below, hard, nonfrac.	
814.2-819.91			3½ CORE	100	100	Silty Claystone "Border Line Oil Shale";	
						dusky brn. 5YR 2/2 to pale brn 5YR 5/2, 15-	
						25% silt, (possably tuffaceous), poor to mod.	
						sorting, calc., laminated, slt. to locally	
						mod. petroliferous - this zone contains more	
						oil than previously described claystone but	
						much less than the "Oil Shales" directly	
						above - rock is borderline & can be classed	
						either way, do have local increasses in oil content	
						restricted to zones < .5' in width - oil	
						content picks up with depth & grades in to	
						the oil shale below, nonfractured.	
819.91-822.3			3½ CORE	50%	66%	Petroliferous Claystone "Oil Shale" very rich	
						blk N-1 to brnish blk, 5YR 2/1, silt-clay mix	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/27/74 TITLE SUN-PHILLIPS-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED L-W FAILING 2500, 6 3/4" DIAMOND BIT, ROTORY/AIR
LOGGED BY W.R. Lund

65

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						w/clay predominant - bituminous material makes determining ratio difficult, mod. to well sorted, noncalc., laminated - well dev. v. strong petroliferous odor, soft to mod hard ≈ 1.0' non recovery this zone.	
822.30 - 822.42			3½ CORE	100	100	Petroliferous ~~Bituminous~~ Tuff; mod. brn. 5YR 3/4 to speckled white N-9, silt to med. sand w/ abundant altered & devitrified? material, poorly sorted, noncalc., thinly bedded - upper and lower contact irregular (differential compaction) & possably gradational, mod hard to hard, somewhat porous, nonfrac.	
822.42 - 823.14			3½ CORE	100	100	Petroliferous Claystone - "Oil Shale"; blkish red 5R 2/2, 10-15% silt, mod. to well sorted, noncalc., laminated, hard, mod. to high petroliferous odor - definate oil shale though not as rich as above, hard, nonfrac.	
823.14 - 829.69			3½ CORE	100	100	Silty Claystone "Borderline Oil Shale"; grayish brown 5YR 3/2 to pale yellowish brown 10YR 6/2, silt 10-25%, poor to mod sorting	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

DATE 10/27/74 TITLE SUN-PHILLPS-SOHIO

START _____ COMPLETE _____

EQUIPMENT USED L-W FAILING 2500, 6 3/8" DIAMOND BIT, ROTORY/AIR

BORING NO. P-3

ELEVATION _____ DATUM _____

WATER LEVEL _____ AFTER _____

LOGGED BY W.R. LUND

66

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						noncalc. to slt. calc., laminated-well	
						dev., slt to mod. petroliferous odor-rock	
						is borderline w/ local increases in oil	
						content, hard, hrz. parting plane w/	
						clean irregular surface at 828.8'	
829.69-830.28						Interbedded Silty Claystones & Petrolif-	
						erous Claystones; blk N-1 to pale yellowish	
						brown 10YR 6/2, up to 30% silt, poor to	
						well sorteded, slt. to mod calc., laminated	
						w/in horizons of similar rock type, thin to	
						mod. bedded between horizons of differing	
						rock type, hard, nonfrac.; rock has a	
						banded appearance - some of the oil	
						shale horizons are quit rich	
830.28-831.85		27	3 1/2 CORE	100%	100%	Petroliferous Silty Claystone - "Oil Shale"; mod.	
						brn. 5YR 4/4 to grayish brn. 5YR 3/2 or	
						brnish blk 5YR 2/1, silt 30-50% gen., poorly	
						sorted, sltly calc., laminated-well dev. but	
						commonly irregular (differential compaction),	
						thin (.05') irregular tuff lenses & between	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-3

DATE 10/27/74 TITLE SUN-PHILLIPS-SOHIO

ELEVATION ________ DATUM ________

START ________ COMPLETE ________

WATER LEVEL ________ AFTER ________

EQUIPMENT USED L-W FAILING 2500, 6 3/4"
DIAMOND BIT, ROTORY/AIR

LOGGED BY W. R. LUND

67

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						831.0-831.05 & 831.11-831.15, - upper & lower	
						contacts wavy - mod. petroliferous - slt,	
						porous, irregular frac. at 831.0 (tuff contact),	
						v. rough surface.	
831.85-835.45		27	3.5" CORE	100	100	Clayey Siltstone; lt. brn. 5YR 6/4 to mod.	
						brn. 5YR 4/4 & locally lt. gray N-7, silt >	
						clay - 60:40 or poss. 70:30 locally - rock	
						is close to borderline, poorly sorted,	
						mod. calc. to calc., laminated - well dev. &	
						regular, hard, nonfrac., may be tuffaceous.	
835.45-842.91		27	3.5" CORE	100	100	Petroliferous Claystone "Oil Shale" grayish	
						red 5R 4/2 to locally grayish blk. N-2, gen. 10-25%	
						silt however certain laminae may approach	
						50:50 locally, poor to mod. sorted, noncalc. →	
						mod. calc. w/ depth, laminated - well dev. -	
						gen. regular though locally differentially compacted,	
						hard, hrz. parting planes at 839.35, 840.5, -	
						smooth & clean; rock is med. to low grade	
						oil shale.	
842.91-848.91		27	3.5" CORE	100	100	Interbedded Clayey Siltstone & Silty Claystone;	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/27/74 TITLE SUN-PHILLIPS-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED L-W FAILING 2500, 6 3/4" DIAMOND BIT, ROTORY/AIR
LOGGED BY W.R. LUND
68

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						alternating laminae v. greatly in silt-clay	
						ratio - several laminae exposed on fresh	
						surface are <.01' thick and alternate back &	
						forth, poor to well sorted, slt. calc. to	
						mod. calc., thinly laminated - well dev.	
						slt. petroliferous, hard, hrz. parting plane	
48.81-849.55						at 845.32	
↓ ↓		27	3.5 CORE	100	100	Petroliferous Claystone - "Oil Shale"; blkish	
						red 5R 2/2 to v. dusky red 10R 2/2, 10-15%	
						silt, mod to well sorted, mod calc, laminated,	
						mod petroliferous, thin (<.02') petrolifer	
						ous tuff stringer at 849.25 - irreg. contact	
						w/rock above & below, hrz. parting plane	
						at 849.25.	
849.55-850.88		27	3.5 CORE	100	100	Silty Claystone "Borderline Oil Shale", mod.	
						brn. 5YR 4/4 to grayish brn. 5YR 3/2, 15-30%	
						silt, poor to mod. sorted, slt. calc., laminated,	
						slt. to mod. petroliferous - borderline, hard,	
						nonfrac	
850.88 - 854.11		27	3.5 CORE	54%	91%	Tuffaceous Claystone w/ frequent Siltstone Laminae;	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-063
BORING NO. P-3
DATE 10/27/74 TITLE SUN-PHILLIPS-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED L-W, FAILING 2500, 6 3/4" DIAMOND BIT, ROTORY/AIR
LOGGED BY W.R. Lund

69

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						pinkish gray 5YR 8/1 to locally grayish red 5R 4/2, pale yellowish brown 10YR 6/2, mod. brown 5YR 3/4, mod. to well sorted, mod. calc. to calc., laminated to thinly bedded, well dev., mod. hard to hard, parting planes abundant - core loss this run assigned to this interval.	
854.11-856.20		27	3.5 CORE	100	100	Petroliferous Claystone; "Oil Shale", blkish red 5R 2/2 to grayish brown 5YR 3/2, 15-25% silt, poor to mod. sorting, mod. calc., laminated, well dev., mod. petroliferous - low to med. quality, hard, nonfractured	
856.20-857.55 Possible Mahogany Marker Ed Cornelius		27	3.5 CORE	100	100	Petroliferous Tuff; grayish brn. 5YR 3/2 to lt. brnish gray 5YR 4/1 & v. lt. gray N-8, v. fine grained - occ. sand, poorly sorted ← both of above difficult to estimate due to bitumen content, noncalc to v. sltly calc., thinly bedded, porous, irregular surfaced parting plane marks upper contact (856.20')	
856.55-857.69		27	3.5 CORE	100	100	Claystone; grayish red 10R 4/2, 5-10% silt	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/27/74 TITLE SUN-PHILLPS -SOHIO
ELEVATION ________ DATUM ________
START ________ COMPLETE ________
WATER LEVEL ________ AFTER ________
EQUIPMENT USED L-W, FAILING 2500, 6 3/8" DIAMOND BIT, ROTORY/AIR
LOGGED BY W.R. LUND

70

RAD

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						well sorted, laminated to thinly bedded, non	
						petroliferous to v. sltly petroliferous, nonfrac.	
857.69-859.41		27	3.5 CORE	100	100	Petroliferous Claystone; "Oil Shale"; blkish red	
						5R 2/2 to brnish blk. 5YR 2/1, 10-15% silt,	
						mod. to well sorted, sltly to mod. calc.,	
						laminated-well dev., mod. to high petroleum	
						content, hard, nonfrac.	
859.41-						Claystone; brnish gray 5YR 4/1, olive gray 5Y 4/1,	
861.84						to dk. gray N-3 -each laminae is a diff.	
						color from those on either side, 5-10%	
						silt, well sorted, ~~tom~~ v. slt. calc., laminated,	
						nonpetroliferous to v. sltly petroliferous, hard	
						nonfrac., parting planes at 860.95	
						861.65	
861.84-		28		100	100	"Oil shale" [siltstone] dusky	
862.94						yellowish brown 10YR 2/2	
						hard, thinly laminated, non	
						calcareous, interbedded	
						tuffs, moderate oil content	
						non-fractured	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/27/74 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED L-W Air Rotary Failing 2500
LOGGED BY M Siembieda

S-A. 10/27 RQD Pg-71

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
862.94		28		100	10	Silty claystone: dark yellowish	
864.30						brown (10YR 4/2) hard,	
						thinly laminated, silt content	
						30% ± 10%, moderatley	
						calcareous, moderatley sorted,	
						some fine pyrite crystals	
						parting plane at 863.21	
						Non-fractured, non-fossil.Ferou	
						very low oil condent	
864.30		28		160	100	Siltstone (Marlstone?) pale	
~~[illegible]~~						yellowish brown 10YR 6/2, hard	
868.23						thinly bedded to laminated	
						generally silt with some clay	
						highly calcareous, Non-Fractured	
						non-fossil.Ferous, parting	
						planes at 865.19 866.95	
868.23		28		100	100	Silty claystone: dusky yellowish	
869.00						brown 10YR 2/2, hard thinly laminated	
						silt content 30% ± 10%, moderatley	
						calcareous, inclussions of	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068 BORING NO. P-3

DATE 10/21/74 TITLE ELEVATION DATUM

START COMPLETE WATER LEVEL AFTER

EQUIPMENT USED L-W Air Rotary Failing 250 LOGGED BY M. Siembieda

S.A. 10/27

72

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
→86900		27				gilsonite and nacholite	
cont						low oil content, parting	
						plane at 868.3	
869.00		27		0	100	Tuff Sandstone: Moderate	
870.42						yellowish brown 10YR 5/4	
						hard, medium to coarse	
						grain massive, slightly	
						calcareous, high oil content	
						"drips" oil, porous, some	
						vertical Fractures.	
870.42		27		100	100 ~~95~~ ~~100~~	Siltstone: Very pale	
891.46						orange 10YR 8/2 to dark	
						yellowish 10YR 4/2 brown, hard	
						laminated some color banding	
						(may appear to be different	
						lithology) ~~[illegible]~~ low clay %	
						generally highly calcareous	
						with some slightly calcareous	
						Zones. fine grained pyrite	
						and veins in core, tuffaceous	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 6/27/74 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED L-W Air Rotary Failing 2500
LOGGED BY M. Siembieda

73

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
cont		27				material in the siltstone	
891.46						parting planes at 873.50	
						874.15, 875.46, 877.45	
						881.70, 882.04, 884.53	
						885.95, 887.50. At 885.7	
						(.1' thick) and 889.1 (.03' thick),	(891.13 → 891.46)
						oil impregnated tuff, very	
						high oil content, seeping	
						from core, sticky. Silt	
						stone become more masive	
						and contains somfine sands at depth	
891.46		28		100	100	silty claystone: Pale yellowish	
895.96						brown 10YR 6/2 hard, thinly	
						laminated, silt contant 30-40%	
						moderatley sorted, moderatley	
						calcareous, fine prryite	
						crystals, some oil in	
						tuff seams, parting plane	
						at 892.95, non-fractured	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/27/74 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED L-W Air Rotary Failing 2500
LOGGED BY M Siembieda

74

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
895.96		28		100	100	Shale: Pale yellowish brown	
897.39						(10YR 6/2) to Grayish brown 5YR 3/2	
						hard, interbedded tuffs,	
						thinly laminated, poorly sorted	
						slightly calcureous, Tuffs	
						are oil impregnated, with	
						oil driping out of core,	
						parting plane 896.06,	
						897.09, 897.39, Non-fractured	
897.39		29		100	100	Sandy siltstone medium light	
913.10						grey (N6) grayish orange pink	
						(5YR 7/2) hard, laminated	
						Moderate sorting, ~~Fin~~ very	
						fine sands, decreasing	
						grain size at depth	
						grading into a shale, slightly	
						calcarecus, fine grained	
						crystals of pyrite, mercasite	
						hematite, a few oil impegnated	
						tuffs, homogeneous, parting	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-3

DATE 10/24/74 TITLE

ELEVATION DATUM

START COMPLETE

WATER LEVEL AFTER

EQUIPMENT USED L-W - Air Rotary

LOGGED BY M Siembieda

75

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
→ 913.10		29				plane at 899.88, 902.87	
cont						906.00, 909.25	
913:10		29		100	100	Shale: Grayish brown (5YR3/2)	
915.74						to black (N1) hard, laminated	
						poorly sorted, slightly to	
						non calcareous, from 913.10	
						to 914.69 low oil content	
						and 914.69 → 915.74 moderate	
						oil content. some intebbed	
						tuffs. Parting planes at	
						914.16 and 914.99	
915.74		29		100	100	siltstone moderate brown	
918.45						(5YR 4/4) hard, thinly laminated	
						poorly sorted, predomicatley	
						silt, slightly to highly	
						calcareous, very thin	
						beds of pyrite/marcasite	
						very homogeneus throughout	
						Non-fractured	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/27/74 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED L-W Air Rotary Failing 2500
LOGGED BY M Siembieda

76

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
918.45 –		29/		100	100	Silty Claystone Moderate	
920.82		/29				brown 5YR 3/4 hard, thin	
						bedded to laminated, some	
						color banding, silt content	
						≈25% ± 10% slightly calcareous	
						fine grained pyrite, some	
						gilsonite stringers, some	
						distortion of bedding caused	
						by differential compaction	
						non-fractured	
10/28/74		W. R. Land					
920.82-921.00		29	3.5 CORE	100	100	Tuffaceous Silty Sandstone; pale brn.	
						5YR 4/2, v. fine qtz sand & coarse silt,	
						subangular, poorly sorted, v. sltly calc,	
						hard to v. hard, slt. porous, nonpetrolif-	
						erous, upper & lower contacts v. flat - lower	
						contact marked by hrz parting plane	
921.00-921.41		29	3.5 CORE	100	100	Petroliferous Claystone; grayish red 5R 4/2,	
						5-10% silt, well sorted, slt. calc, laminated -	
						well dev., mod petroleum content, nonfrac	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/28/74 TITLE SUN-PHILLPS-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED L-W FAILING 2500, 6 3/8" DIAMOND BIT, ROTORY/AIR
LOGGED BY W.R. LUND

77

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	ROD Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
921.41-921.52		29	3.5 CORE	100	100	Tuffaceous Silty Sandstone; pale brn. 5YR 4/2, v fine qtz sand & coarse silt, subang., poorly sorted, v. slt. calc., thinly bedded, hard, nonfrac., nonpetroliferous	
921.52-923.35		29	3.5 CORE	100	100	Silty Claystone; pale yellowish brn. 10YR 6/2, pale brn. 5YR 5/2 and med. lt. gray N-6, 20-30% silt, poorly sorted, slt. to mod. calc., laminated-well dev., nonpetroliferous to locally sltly petroliferous, hard, nonfrac.	
923.35-923.50		29	3.5 CORE	100	100	Petroliferous (Tuffaceous?) Silty Sandstone - Sandy Siltstone; grayish blk. N-2 to med. dk. gray N-4, bitumen content makes it difficult to estimate silt-sand ratios - silt appears to be high, poorly sorted, slt. calc., thinly bedded, hard, nonfrac.	
923.50-925.11		29	3.5 CORE	100	100	Petroliferous Claystone "Bourderline Oil Shale"; med. lt. gray N-5 to pale red 5R 6/2, 15-20% silt, poorly sorted, slt. calc, laminated-well dev., petrolium content is	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/28/74 TITLE SUN-PHILLPS-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED L-W. FAILING 2500, 6 3/4 DIAMOND BIT, ROTORY/AIR
LOGGED BY W.R. LUND

78

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						low to mod-rock could be grouped w/ mat-	
						erial directly below, irregular rough	
						surfaced fracture at 924.35'	
925.11-927.12		29	3.5 CORE	100	100	Claystone; grayish orange pink 5YR 7/2, pale	
						yellowish brn. 10YR 6/2, & lt. gray N-6, <10%	
						silt, well sorted, slt. calc., thinly laminated	
						nonpetroliferous to locally siltly petroliferous,	
						hard, nonfrac.	
927.12-927.35		29	3.5 CORE	100	100	Petroliferous (Tuffaceous?) Siltstone; blk N-1	
						to grayish blk N-2, v. high petrolium	
						content - unable to decern indiv. grains	
						or est. sorting, v. siltly ~~sorted~~ calc., thinly bedded,	
						hard, nonfrac.	
927.35-934.15		29	3.5 CORE	100	100	Silty Claystone; pale brn. 5YR 5/2, to lt. gray	
						N-6, 15-30% silt (varies considerably), poor to	
						mod sorting, slt. calc., laminated, nonpetrolif-	
						erous to slt. petroliferous locally, hard, hrz.	
						parting planes at 927.42', 929.0', 930.91'; thin	
						.1' tuff stringer lt. brn 5YR 6/4 w/ irregular	
						contacts, located between 930.52 and 930.59.	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068

DATE 10/28/74 TITLE SUN - PHILLPS - SOHIO

START ____ COMPLETE ____

EQUIPMENT USED C-W. FAILING 2500, 6 3/4 DIAMOND BIT, ROTORY/AIR

BORING NO. P-3

ELEVATION ____ DATUM ____

WATER LEVEL ____ AFTER ____

LOGGED BY W. R. Lund

79

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	ROD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
934.15 - 935.19		29	3.5 CORE	100	100	Petroliferous Claystone; brnish blk 5YR $^{2}/_{1}$	
						to dusky brn. 5YR $^{2}/_{2}$, 5-10% silt, well sorted,	
						noncalc., laminated-well dev & regular, med. to	
						high petroleum content, hard, nonfrac.	
935.19 - 935.34		29	3.5 CORE	100	100	Petroliferous Tuffaceous Sandstone; grayish brn.	
						5YR $^{3}/_{2}$ (indistinct streaks) & dk. gray N-3, silt	
						30-40%, sand predom. subrnded to rounded	
						qtz, poorly sorted, noncalc, thinly bedded,	
						med petroleum content, hard, hrz parting	
						plane at 935.33	
935.34 - 943.09		29	3.5 CORE	93%	100	Claystone - Silty Claystone; v. dark red 5R $^{2}/_{6}$,	
						pale brown 5YR $^{5}/_{2}$, blkish red 5R $^{2}/_{2}$ & pale	
						reddish brown 10R $^{5}/_{4}$ (v. colorful rx.), 5-20%	
						silt (varies), mod. to well sorted, noncalc.,	
						to slt. calc., laminated-well dev.-alter-	
						nating laminae are diff. colors, generally	
						nonpetroliferous - locally slt. petroliferous, hard,	
						hrz parting planes at 936.30, 936.70, 936.95	
						940.27, 941.35	
943.09 - 943.94						Petroliferous Claystone - "Oil Shale", dusky brn. 5YR $^{2}/_{2}$	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BOring NO. P-3

DATE 10/22/74 TITLE
ELEVATION DATUM

START / COMPLETE
WATER LEVEL AFTER

EQUIPMENT USED L-W, FAILING 2500, 6 3/4 DIAMOND BIT, ROTORY/AIR
LOGGED BY W. R. LUND

80

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						to blkish red 5R $^2/_2$, 10-15% silt, mod. to well sorted, noncalc., laminated-well dev., mod. petroliferous w/finly disseminated bituminous material, hard, nonfrac.	
943.94-944.42		29	3½" CORE	100	100	Tuffaceous Sandy Siltstone, med. gray N-5 w/ irregular streaks of mod. brn. 5YR $^3/_4$, ± 35% v. fine qtz sand, poorly sorteded, non-calc., thin to med. bedded, slt. petroliferous, upper & lower contacts smooth to wavey, more porous than claystone, slt. friable	
944.42-948.71		29	3½ CORE	100	100	Claystone-Silty Claystone, mod. brn. 5YR $^3/_4$ to grayish orange pink 5YR $^7/_2$, 10-30% silt (varies), poor to well sorted, mod calc. to calc., laminated-well dev & regular, nonpetroliferous to slt. petroliferous except for two thin horizons between 944.80 & 944.95 hrz. parting plane at 946.8	
948.71-949.25		29	3½ CORE	100	100	Petroliferous Claystone-Oil Shale, blkish red 5R $^2/_2$, 10-15% silt, poor to mod. sorting, mod. calc., laminated-well dev., hard-nonfrac. mod. petroliferous.	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068 BORING NO. P-3

DATE 10/26/79 TITLE SUN-PHILLPS-SOHIO ELEVATION _____ DATUM _____

START _____ COMPLETE _____ WATER LEVEL _____ AFTER _____

EQUIPMENT USED L-10, FAILING 2500, 6 3/4" DIAMOND BIT, ROTORY/AIR LOGGED BY W.R. LUND

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
949.25-949.60		29	3½ CORE	90%	90%	Tuff - Tuffaceous Sandstone; mod. yellowish brown 10YR 5/4, v. fine to med. grained subrounded to rounded qtz sand grains in a coarse qtz silt ±15% matrix w/ occ. isolated mafics (biotite?), slt. calc., bedding indist or contorted, slt. petroliferous, porous, somewhat friable, - sticky bitumenous material in some pours, irreg. frac. at 949.3 = 0° or 5°	
949.60-951.61		29/30	3.5" CORE	100/99.5%	100	Petroliferous Claystone - "Oil Shale"; grayish blk. N-2, 10-15% silt, mod. to well sorted noncalc., laminated - locally distorted, highly petroliferous, hard, parting planes at 950.35, 950.90, 951.21 - bedding near lower contact, contorted & bent	
951.61-952.68		30	3.5" CORE	82%	100	Silty Claystone; med. dk. gray N-4 to pale brn. 5YR 5/2, 10-30% silt, poor to well sorted (varies w/in laminae), noncalc. to slt. calc., laminated - well dev. & regular, nonpetroliferous, hard, hrz. parting planes at	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-3

DATE 10/28/74 TITLE SUN-PHILLPS - SOHIO

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED C-40 FAILING 2500, 6 3/4" DIAMOND BIT, ROTORY/AIR

LOGGED BY W.R. Lund

82

RQD

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						952.24 & 952.68	
952.68-954.05		30	3.5 CORE	95%	100%	Petroliferous Claystone, (Oil Shale); blkish	
						red 5R4/2, blk N-1, & lt. olive gray 5Y5/2,	
						10-15% silt, mod to well sorted, noncalc.	
						to v. slt. calc., laminated - well dev. -	
						locally contorted, highly petroliferous,	
						hard, irregular surfaced parting planes	
						at 953.7 & 953.85, ltly. coated w/calcite	
954.05-957.62		30	3.5" CORE	23%	87%	Silty Claystone-Shale; lt. olive gray 5Y6/1,	
						pinkish gray 5YR8/1, 5-15% silt, mod to	
						well sorted, noncalc. to slt. calc., laminated,	
						mod-hard to hard, .46' NONRECOVERY ASSIGNED	
						to this interval, core is broken into numerous	
						"silver dollar" pieces .15' to .03' in width	
						non petroliferous.	
957.62-961.88		30	3.5" CORE	90.5%	100%	Petroliferous Claystone - Oil Shale; grayish	
						blk N-2 to dk. gray N-3 or blkish red 5R4/2,	
						5-10% silt, well sorted, noncalc., laminated - well	
						dev. - locally see effects of differential com-	
						paction - pinch & swell - minor offsets etc.	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/23/74 TITLE SOH-PHILLPS -SOHIO
ELEVATION ____ DATUM ____
START ____ COMPLETE ____
WATER LEVEL ____ AFTER ____
EQUIPMENT USED L-W FAILING 2500 6 3/4" DIAMOND BIT, ROTORY/AIR
LOGGED BY W. R. Lund

83

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	ROD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						hard, hrz. parting planes at 958.91, 959.40,	
						959.61, 960.0, 960.20 (assoc. w/ v. thin tuff stringer),	
						961.75	
961.83-964.35		30	3.5" CORE	100	100	Claystone - Silty Claystone; brnish gray $5YR^{4/1}$	
						to mod. brn. $5YR^{3/4}$, 10-20% silt, mod to	
						well sorted, v. slt. calc, laminated-well	
						dev., slt. petroliferous, hard, hrz. parting	
						planes at 962.53, 963.25, 963.73, frac. at	
						15° at 964.19	
964.35-966.17		30	3.5	100	100	Petroliferous Claystone - "Oil Shale"; blk N-1	
						to blkish red $5R^{2/2}$ or v. dusky red $10R^{2/2}$	
						5-10% silt, well sorted, noncalc, highly	
						petroliferous w/ abundant finally disseminated	
						bituminous flks, laminated - upper 1' highly	
						contorted - offsets, roll structures, etc.,	
						hard, hrz parting planes at 964.72, 965.25	
966.17-971.92		30	3.5	100	100	Silty Claystone - Shale; brnish gray $5YR^{4/1}$	
						mod. brn. $5YR^{3/4}$, pinkish gray $5YR^{8/1}$, 10-30% +	
						silt, poor to mod. sorting, mod calc, lam-	
						inated - well dev c̄ regular + small "mudchip"	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068 BORING NO. P-3

DATE 10/28/74 TITLE SUN-PHILLPS - SOHIO ELEVATION ______ DATUM ______

START ______ COMPLETE ______ WATER LEVEL ______ AFTER ______

EQUIPMENT USED L-W FAILING 2500 6 3/4" DIAMOND BIT, ROTORY/AIR LOGGED BY W. R. LUND

84

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						breccia .05' wide at 969.40'; nonpetro-	
						liferous to slt. petroliferous, hard, hrz.	
						parting planes at 966.73, 966.54, 967.55,	
						968.28, 968.50, 969.29, 970.12, 970.70, ċ	
						971.25 - rx. shows def. tendency to	
						split along bedding when struck w/ hammer	
						(paper thin)	
971.92-973.50		30	3.5" CORE	100%	100%	Petroliferous Claystone - "Oil Shale", blk N-1	
						to olive gray 5Y 4/1, 5-10% silt, well sorted,	
						noncalc, laminated - localized pinching ċ	
						swelling, highly petroliferous ^{3pnc} - 972.34-	
						972.40 oozes a stiff tar like sub-	
						stance - v. sticky, hard, irreg. surfaced	
						parting planes at 972.90 ċ 973.50 - clean.	
973.50-975.21						Claystone - Silty Claystone - "Borderline Oil Shale";	
						olive gray 5Y 4/1 to brnish gray 5YR 4/1,	
						10-20% silt, mod. to well sorted, v. sltly.	
						calc., laminated - indistict, slt. to mod.	
						petroliferous w/ occ. v. fine flks. of	
						bituminous material, hard, hrz. parting	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068 BORING NO. P-3

DATE 10/24/74 TITLE SUN-PHILLIPS-SOHIO ELEVATION ______ DATUM ______

START ______ COMPLETE ______ WATER LEVEL ______ AFTER ______

EQUIPMENT USED L-10 FAILING 2500 6 3/4" DIAMOND BIT, ROTORY/AIR LOGGED BY W. R. LUND

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition	85 Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						planes at 973.93, 974.36, 974.91	
975.21-976.12						Petroliferous Claystone-"Oil Shale" blk N-1	
						to dusky yellowish brn. 10YR 2/2, 5-10% silt-	
						difficult to estimate due to high oil content,	
						well sorted, noncalc., laminated-beds	
						very contorted-offsets of .1'-.2', roll	
						structures, very petroliferous-strong odor,	
						hard, nonfrac.	
976.12-980.90		30	3.5" CORE	74%	100%	Silty Claystone; med lt. gray N-6 to grayish	
						brown 5YR 3/2 (near oil shale directly above),	
						10-35% silt (varies), poor to locally well	
						sorted, slt. calc. to med. calc., laminated-	
						indistinct, non to locally sltly petroliferous,	
						hard, parting planes at 976.47, 976.82,	
						977.30, 977.80, 978.20, 978.50, 978.85, 979.10,	
						979.45, 979.53	
980.90-985.03		31	3.5 CORE			Iterbedded Silty Claystones and Sandy Clayey	
						Siltstones; rock is med to thick bedded	
						between rock types (range from .2' to	
						>.35') but the ~~siltstones~~ claystones are thinly laminated	

NOTES:

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FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. ~~74~~ P-3

DATE 10/25/74 TITLE SUN-PHILLPS-SOHIO

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED L-W-FAILING 2500-ROTORY/AIR, 6 3/4" DIAMOND BIT

LOGGED BY W.R. LUND

86

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						within their interval while no bedding	
						at all is apparent w/in the siltstones,	
						med. gray N5 to med lt. gray N-6 & yellowish	
						gray 5Y 8/1 to lt. greenish gray 5GY 8/1, siltstones	
						are poorly sorted - claystones are mod to well	
						sorted, siltstone is mod. calc - claystone	
						silty calc., both are nonpetroliferous with	
						only rare v. thin mod. petroliferous horizons	
						in the shale (claystone), hard, parting planes	
						at 980.28, 980.42, 981.20, 981.78, 982.20,	
						982.30, 982.41, 982.73, 983.05, 983.43,	
						983.91, 984.22, 984.67, 984.95 - most faces	
						polished - siltstone intervals contain occ.	
						biotite	
985.03 -995.03			(Marlstone?)			Sandy Siltstone w/occ thin horizons of	
						Claystone; med. gray N-5 to med. dk. gray	
						N-4, poorly sorted, consists of qtz, biotite,	
						a v. fine grained mafic & unidentifiable (w/ 14x lense)	
						matrix, v. calc., fizzes violently - more so	
						than any other rx in this boring, massive	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO.
DATE 10/28/74 TITLE SUN-PHILLPS-SOHIO
ELEVATION
DATUM
START
COMPLETE
WATER LEVEL
AFTER
EQUIPMENT USED L-W FAILING 2500 6 3/4" DIAMOND Bit, Rotory/AIR
LOGGED BY

87

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						bedding broken by an occasional claystone	
						horizon which is generally <.1' thick,	
						nonpetroliferous, hard, parting planes at	
						985.65, 985.93, 986.82, 987.20, 987.54, 987.96,	
						988.35, 988.93, 989.65, 990.08, 990.43, 990.80,	
						992.16, 993.7, 994.3 - most faces are smooth	
						and polished ≈ 1.6' of non recovered	
						core has been assigned to ~~[illegible]~~ 993-996 ≈	
						half that is in this interval.	
995 03 ~~995.03~~-1002.59						Silty Claystone - Clayey Siltstone ; lt. olive	
						gray 5Y 6/1 to yellowish gray 5Y 7/2, silt	
						sand content shifts rapidly both	
						claystones and siltstones present as fine	
						laminae, poor to well sorted, ~~mod.~~ calc. to	
						v. calc., laminated - well dev. - closely resembles	
						the laminated claystones uphole - perhaps	
						the best term for this rx would be	
						shale - since alternating laminae have	
						such a range in grain size and sorting,	
						nonpetroliferous, hard, parting planes at	

NOTES:

FIELD LOG OF BORING

OJECT NO. 74-068
BORING NO. P-3
DATE 10/3[illegible] TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED L-W-Air Rotary Failing 2500
LOGGED BY M. Siembieda

P-88

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						998.44, 999.31, 1000.25, 1000.90, 1000.74,	
						1002.39	
1002.50		31		100	100	Siltstone: dark yellowish brown	
1004.30						10YR4/2: hard, laminated.	
						75% silt 25% clay, very slightly	
						calcareous, some tuffaceous	
						material present, some	
						gilsonite stringers, poorly	
						sorted. parting planes at	
						1002.74, 1003.53 non-fractured.	
1004.30		31		100	100	"Oil shale" (claystone) black (N1)	
1007.45						dusky brown 5YR2/2, hard	
						finely laminated, low silt %	
						<15%, non-calcareous, poorly	
						sorted, some tuff stringers	
						moderate oil content, parting	
						planes at, 1004.30, 1004.80	
						1005.13, 1006.29, 1007.3	
						Non-fractured, non-fossil. Ferou	

OTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/23/74 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED L-W Air Rotary Failing 2500
LOGGED BY M. Siembieda

~~89~~ P. 89

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1007.45		31		40	100	Siltstone, Pale yellowish brown	
1012:34		32				10 YR 6/2, medium bluish grey	
						5B 5/1, hard, some fine sand,	
						and clay material, thin bedded	
						to laminated, moderate sorting	
						moderate to highly calcareous	
						stringers of tuff, veins	
						of fine-grained pyrite	
						parting planes at 1007.64	
						1007.87, 1008.41, 1009.35	
						1011.08, 1011.37, 1011.77	
						becoming more sandy at depth	
1012:34		32		75 ~~100~~	100	Silty claystone: dusky yellowish	
1016.43						brown 10YR 2/2 hard, faint bedding	
						but appears laminated silt	
						content 25-35%, poorly sorted	
						slightly calcareous, tuffaceous	
						material in claystone, parting	
						planes at 1012.59, 1013.83	
						1014.42, 1015.44. Tuff sandston	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068 BORING NO. P-3

DATE 10/25/74 TITLE ______ ELEVATION ______ DATUM ______

START ______ COMPLETE ______ WATER LEVEL ______ AFTER ______

EQUIPMENT USED L-N Air Rotary Failing 2500 LOGGED BY M. Siembieda

90

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
cont'		32				beds at 1015.3 (.1' thick) and	
						1016.3 (.07' thick) medium to	
						coarse grained, porous, highly	
						calcareous, hard	
1016.43		32		~~50~~ 47	100	Sandy siltstone: Very pale orange	
1017.85						10YR 8/2 to Pale yellowish orange	
						10YR 6/2, moderatley hard to hard	
						medium to thinly bedded, moderate	
						sorting ≈65% silt ≈25% fine sand,	
						≈10% clay, highly calcareous	
						comprised mostly of tuffaceous	
						material, parting plane	
						at 1016.94, 1017.25, 1017.73	
						non-fractured, non-fossiliferous	
1017.85		32		96	100	Claystone: dark grey (N3)	
1022.19						hard, bedding faint but is	
						laminated silt content low >20%	
						poorly sorted, moderately	
						calcareous, some tuffaceous	
						material in claystone, parting	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/23/74 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED L-W Air Rotary Failing 2500
LOGGED BY H. Siembieda

91

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
cont		32				planes 1018.55, 1019.00, +	
						1019.45, 1020.79, 1022.18	
						~~[illegible]~~ non-fractured	
						- Gradational Contact -	
1022.19		32		45	65	Siltstone very pale orange	
1024.48						(10 YR 8/2) moderately hard to	
						hard, thin bedded to massive	
						some fine sands (15%) and clay	
						(20-30%) highly calcareous	
						parting planes at 1022.34	
						1022.50 1024.37, non fractured	
						non-fossiliferous, ~~non fracture~~	
1024.48		32		100	100	Silty claystone olive grey 5Y 4/1	
1032.51						hard, bedding faint, laminated	
						some silt < 15%, slightly	
						calcareous, some fine grained	
						mica, mod poorly sorted, very	
						homogeneous, Parting Planes at	
						1025.00, 1026.01 1025.63, 1028.72	
						1029.33, 1030.11, 1030.91, 1031.73	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/28/74 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED L-W Air Rotary Failing 2500
LOGGED BY M. Siembieda

92

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
con't		32				1032.42, 1033.00, 1034.92	
						1035,03, 1036,08 1037.25	
						Non - fractured, non-fossiliferous	
1037.51		32		100	100	Siltstone very pale orange	
1038.50						10 YR 8/2, hard, thin bedded	
						to massive, clay 25% some	
						fine sands, highly calcareous	
						parting plane at 1037.70	
						Non fractured; non fossiliferous	
1038.50		32		100	100	claystone: Olive grey 5Y4/1, pale brown	
1053.79		33				hard, laminated, poorly sorted	5YR 5/2
						(little silt 7/10%), slightly	
						calcareous, very homogenous	
						non-fractured non-fossiliferous	
						pyrite occurs in pockets	
						and as veins Parting planes at	
						1040.57, 1040.88, 1042.70	
						1044.04, 1044.71, 1046.64	
						some tuffaceous material	
						in clay stone	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/28/74 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED L-W - Air Rotary Failing 2500
LOGGED BY M. Siembiecka

RQD
93

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1053.79 ~~[illegible]~~		33		100	100	Marlstone (and intebedded tuffs)	
1057						light grey (N7) very pale orange	
(gradational)						(10YR 8/2) moderately hard to	
						hard, thinly bedded to meddium	
						bedded, poorly sorted, very	
						highly calcareous, some offset	
						in bedding up to .05' displacment	
						and traces up to .3', some zones	
						of mica occur, locally high %	
						parting plane at 1056.18	
						botton contact appears gradational.	
						Tuffs are oil impregnated,	
						"driping oil" highly calcareou	
						hard, occur in upper ½ of ~~zone~~	
						unit	
1057-3		33			100	Silty claystone: medion grey	
1081.59						(N5), Pale yellowish brown 10YR 6/2	
						hard, laminated, silt content	
						varies ~~[illegible]~~ 15-30%, poorly sorted	
						~~[illegible]~~ moderately	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-3

DATE 10/29/74 TITLE

ELEVATION DATUM

START COMPLETE

WATER LEVEL AFTER

EQUIPMENT USED L-W Air Rotary Failing 2500

LOGGED BY H. Siembieda

94

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1057 – ?		33		[illegible]	100	Calcareous, some interbedded tuff	
con't				100		(thin) pyrite occurs disseminated	
1081.59						throughout rock, unit is	
						very homogeneous, parting planes	
						at 1057.81, 1059.85, 1062.75	
						1066.71 1066.89, 1067.25	
						1067.33, 1067.42, 1081.01	
		34				pyrite occurs in veins and vugs	
						(1075.32 1078.04, 1078.37	
						1080.12, 1080.35, thin veins	
						occurs)	
1081.59		34		48	100	Marlstone (some interbedded	
1084.65						claystone) Very Pale orange	
						(10YR 8/2) dark yellowish brown	
						(10YR 4/2) moderately hard	
						to hard, generally silt to	
						clay size particles but some	
						very fine quartz sand lenses	
						also included, moderately	
						sorted, laminated to medium	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/25/74 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED L-W Air Rotary Failing 2500
LOGGED BY M Siembieda

95

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1081.59		3L				bedded, some color banding	
1084.65						contacts are gradational	
cont'						parting planes at 1082.68	
						1082.78, 1083.02, 1083.08	
						1083.23, 1083.77, 1084.12	
10/29/74	W.R.		CUNO				
1084.65-1090.44			3.5 CORE	100	100	Silty Claystone; dusky brn. 5YR 2/2 to	
						brnish gray 5YR 4/1, 15-30% silt, poor to	
						mod. sorted, noncalc, laminated - well dev.,	
						nonpetroliferous to slt. petroliferous, hard,	
						hrz. parting plane at 1087.74, disseminated pyrite	
1090.44-1090.59			3.5 CORE	100	100	Tuff - Tuffaceous Siltstone; med. dk. gray	
						N-4, coarse silt and v. fine sand - predom.	
						subang. to subrnded qtz. w/ abundant	
						platy fine flks of biotite, noncalc, indis-	
						tinct bedding, hard, irregular faced frac.	
						at 1090.44.	
1090.59-1091.53			3.5 CORE	100	100	Petroliferous Claystone, ("Oil Shale"); dusky	
						brown 5YR 2/2, 10-15% silt, mod to well	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/25/74 TITLE SUN-PHILLIPS-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED L-W, FAILING 2500, 6¾" DIAMOND BIT, ROTORY/AIR
LOGGED BY W.R. Lund

P. 96

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						sorted, v. sltly calc., laminated-well	
						dev., hard, nonfractured.	
1094.58-1094.97			3.5" CORE	100	100	Silty Claystone-"Borderline Oil Shale"	
						blkish red 5R 2/2, 5-10% silt, well sorted,	
						abundant disseminated pyrite, v. sltly	
						calc., laminated-well dev.- locally pinch	
						and swell structures, hard, nonfrac.	
1094.97-1095.33			3.5" CORE	100	100	Tuffaceous Petroliferous Claystone-"Oil Shale"	
						blkish red 5R 2/2 to grayish orange 10YR 7/4-	
						appears streaked along indiv. laminae,	
						30-40% silt in more tuffaceous zones, lower	
						± 10-15% in petroliferous zones, poor to	
						mod. sorting, v. calc. acid produces violent	
						fizzing, mod. petroleum content, hard, laminated-	
						well dev c̄ regular - lower contact marked by	
						an irregular surfaced hrz. parting plane.	
1095.33-1097.43			CORE, 3.5"	110	100	Sandy Siltstone; lt. gray N-6, subang to	
						subrnd v. fine qtz sand c̄ coarse qtz	
						silt w/ occ. platy mafics (biotite?), sand-silt	
						ration approx 25:75, poorly sorted, calc.,	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/29/74 TITLE SUN-PHILLIPS-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED L-W, FAILING 2500, 6 3/4" DIAMOND CORE, ROTORY/AIR
LOGGED BY W.R. LUND

97

RQD

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						laminated-frequently contorted, nonpetro-	
						liferous except for local concentrations of	
						bituminous material on some fractures (mechanical),	
						hard, contrac., fresh surfaces have a sacroidal	
						texture - (calcite)	
1099.45-1102.95		38/39	CORE " 3.5	100	100	Silty Claystone; lt. gray N-6 to lt. olive	
						gray 5Y 6/1, 10-20% silt, mod. to well sorted,	
						calc., laminated - well dev. to indistinct,	
						sltly. petroliferous, hard, hrz parting plane	
						at 1099.84, fresh faces have a sacroidal	
						texture (calcite), occ. disseminated pyrite,	
						additional parting planes at 1101.69' & 1102.93'	
1102.95-1107.12		39	3.5 CORE	88%	100	Tuffaceous Claystone & Sandy Claystones; pale	
						yellowish brn. 10YR 6/2, grayish orange pink	
						5YR 7/2 to v. pale orange 10YR 8/2, 10-15% silt	
						locally sand >10% but rare, well sorted, mod	
						calc. to calc., laminated to thinly bedded-	
						regular in upper portion of horizon but v.	
						contorted in lower horizon - offsets, bending etc,	
						slt. petroliferous to locally mod. petroliferous (rare),	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/29/74 TITLE SUN-PHILLIPS-SOHIO
ELEVATION ____ DATUM ____
START ____ COMPLETE ____
WATER LEVEL ____ AFTER ____
EQUIPMENT USED L-W, FAILING 2500 6 3/4 DIAMOND BIT, ROTARY / AIR
LOGGED BY W. R. Lund
98

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						hrz parting planes at 1103.20, 1103.31, 1104.20	
						1104.38, 1104.59, 1106.90, 1107.12	
1107.12-1109.58		39	3.5 CORE	100	100	Claystone; lt. gray N-7, med lt. gray N-6 w/	
						occ laminae mod. brn. 5YR 3/4, <10% silt,	
						well sorted, slt. to mod calc, laminated-	
						faint, nonpetroliferous, hard, hrz parting	
						planes at 1107.79 & 1109.55 - both occ. along	
						v. thin <.01' ~~med.~~ dk. gray N-4 tuff lenses.	
1109.58-1110.92		39	3.5 CORE	100	100	Petroliferous Claystone-"Oil Shale," blkish red 5R 2/2 10-15%	
						silt, mod. to well sorted, noncalc, laminated-	
						well dev. & regular, mod. to low petrolium	
						content (low grade), hard, nonfrac.	
1110.92-1111.03		39	3.5 CORE	100	100	Silty Sandstone (Tuffaceous?), dk. gray N-3,	
						v. fine qtz sand & coarse qtz. silt, subrounded	
						to rounded, poorly sorted, slt. calc, thinly bedded,	
						nonpetroliferous, hard, nonfrac.	
1111.03-1114.84		39	3.5 CORE	100	100	Silty Claystone; brnish gray 5YR 4/1, med. gray N-5,	
						lt. brn. 5YR 6/4, 10-15% silt, mod. to well	
						sorted, calc, laminated - well dev., slt.	
						petroliferous, hard, hrz. parting planes at	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-3

DATE 10/29/74 TITLE SUN-PHILLIPS-SOHIO

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED L-W- FAILING 2500, 6 3/4" DIAMOND BIT, ROTORY/AIR

LOGGED BY W.R. LUND

99

RQD

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						1112.96 - smooth - clean face	
1114.84 - 1115.59		39	3.5" CORE	100	100	Petroliferous Claystone "Oil Shale";	
						pale yellowish brn. 10YR 6/2, mod. brn. 5YR 3/4,	
						greyish red 10R 4/2, <10% silt, well sorted,	
						noncalc., laminated - well dev., slt. to mod.	
						petroliferous - low grade, hard, nonfiss.	
1115.59 - 1123.43		39	3.5 CORE	94%	100	Silty Claystone; med dk. gray N-4 to pale	
						yellowish brn. 10YR 6/2, 15-20% silt, mod. sorted,	
						calc. → slt. calc. w/depth, laminated - well dev.	
						to faint, nonpetroliferous to slt. petroliferous,	
						hard, hrz. parting planes at 1116.61, 1117.64,	
						1118.80, 1119.0, 1121.9 - faces clean & smooth.	
1123.43 - 1123.95		39	3.5 CORE	100	100	Petroliferous Claystone - "Oil Shale" blkish red	
						5R 2/2; 5-10% silt, well sorted, slt. calc.,	
						laminated - well dev., slt. to mod. petrolif-	
						erous - low grade, hard, hrz. parting plane at	
						1123.5' - smooth - clean face.	
1123.95 - 1125.95		39	3.5 CORE	91.5%	100	Silty Claystone; med. dk. gray to brnish gray	
						5YR 4/1, 10-15% silt, mod. to well sorted, non-	
						calc., laminated - indistinct, nonpetroliferous	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068 BORING NO. P-3

DATE 10/29/74 TITLE SUN-PHILLPS-SOHIO ELEVATION ______ DATUM ______

START ______ COMPLETE ______ WATER LEVEL ______ AFTER ______

EQUIPMENT USED L-W, FAILING 2500, 6¾" DIAMOND BIT ROTORY/AIR LOGGED BY W. R. LUND

100

RQD

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						except for a thin gilsonite stringer at	
						1124.90, irregularly surfaced parting planes at	
						1124.35, 1124.85, 1125.02, 1125.85	
1125.95–1127.27		39	3.5 CORE	100	100	Petroliferous Claystone - "Oil Shale" blkish red	
						5R2/2, 5-10% silt, well sorted, slt. calc.,	
						laminated, well dev., hard, nonfrac.	
1127.27–1127.42		39	3.5 CORE	100	100	Silty Sandstone (Tuffaceous?), med. gray	
						N-5, subang to subrnded & fine qtz. sand	
						& coarse qtz. silt, poorly sorted, noncalc.,	
						non petroliferous, porous, hard, nonfrac.	
1127.42–1127.59		39	3.5 CORE	100	100	Petroliferous Claystone - "Oil Shale", blkish	
						red 5R2/2, 10-15% silt, mod. sorted, noncalc,	
						laminated - well dev., mod. petroliferous-low	
						grade → med grade, nonfrac.	
1127.59–1123.2		39	3.5 CORE	0%	100	Quartz Sandstone; lt. gray N-6 to lt. brnish gray 5YR6/1,	
						fine to med. grained, subrounded to rounded,	
						poorly sorted qtz sand in a silt matrix >10%,	
						bedding indistinct, nonpetroliferous, hard,	
						irreg. surfaced fracs. at 1128.05 & 1128.2', rx	
						is sltly friable & porous.	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/29/74 TITLE SUN-PHILLIPS-SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED L-W, FAILING 2500, & 3½" DIAMOND Bit, ROTORY/AIR
LOGGED BY W.R. LUND

101

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1128.20 – 1134.39		39/	3.5" CORE	91.5%	100	Silty Claystone - Clayey Siltstone; lt. gray N-6	
		/40				silt-clay ratio 40:60 - but rotates back &	
						forth as to which is forty & which is sixty, poor	
						sorting, slt. to mod. calc, laminated to	
						thinly bedded - indistinct, silty petroliferous,	
						hard, hrz. parting planes at 1128.61, 1129.30	
						131.36, 131.37, 13155 - between 1133.40 & 1133.7	
						rock broken up	
1134.39-1137.59		40	3.5 CORE	100	100	Siltstone; med. gray N-5 w/ tuffaceous stringers	
						in the first foot yellowish gray 5Y 7/2, rnded	
						qtz, a v. fine mafic & matrix, poorly sorted,	
						mod. calc, thinly bedded → to indistinct	
						or massive w/ depth - upper foot contains	
						several horizons that are more tuffaceous	
						than the remainder of the rock, hard - difficult	
						to split w/ chisle, nonpetroliferous, nonfrac.	
1137.59-1144.91		40	3.5 CORE	99	100	Claystone - Silty Claystone; med. dk. gray	
						N-4, olive gray 5Y 4/1, local thin tuffaceous	
						laminae pinkish gray 5YR 8/1, 5-10% silt,	
						well sorted, mod. calc. to calc., laminated - well dev.	

NOTES:

FUGRO

7-23-73 L-01

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-3

DATE 10/29/74 TITLE SUN-PHILLPS-SOHIO

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED L-W, FAILING 2500, 6¾" DIAMOND BIT, ROTORY/AIR

LOGGED BY W. R. Lund
RL

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						to locally faint, nonpetroliferous to sltly	
						petroliferous, hard, hrz. parting planes	
						at 1138.90, 1140.18, 1140.23, 1141.25, occ. laminae	
						lighter colored - probably tuffaceous.	
1144.91-1145.61		40	3.5" CORE	0	100%	Silty Claystones & Tuffaceous Claystones;	
						v. similar to the rock described directly	
						above except the number of lt. colored	
						tuffaceous laminae has increased drastically -	
						apparantly as a result this area has	
						become a zone of weakness (note 0%	
						RQD) & is split by 5 hrz. parting planes	
						while the rock ~~on~~ both sides is notable	
						for its lack of fractures or parting planes	
1145.61-115189		40	3.5" CORE	91.5%	100%	Claystone - "Borderline Oil Shale"; med. dk.	
						gray N-4, olive gray 5Y4/1, & lt. brnish gray	
						5YR6/1, 5-10% silt, well sorted, v. sltly calc	
						to calc., laminated - faint to well dev.,	
						sltly petroliferous - reflected in darker	
						color of rock than that in 1137.59-1144.91	
						interval - if oil shale it is v. low grade.	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-3

DATE 10/29/74 TITLE SUN-PHILLIPS-SOHIO

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED L-W FAILING 2500

LOGGED BY W. R. Lund

103

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	RQD ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						parting planes at 1149.62, 1149.75	
						1150.5, 1150.86, - clean & smooth	
1151.89 - 1152.09		40	CORE 3.5"	100	100	Bitumen Impregnated Sandy Siltstone; grayish	
						blk N-2 to blk N-1, fine to med grained, rnded	
						qtz decernable remainder of constituents	
						masked by bitumenous material, poorly	
						sorted, noncalc., indistinct bedding, porous,	
						v. high bitumen - petroleum content - faces	
						covered w/ blebs of a sticky tar like	
						substance, sltly friable	
1152.09 1155.86		40	CORE 3.5	100	100	Silty Claystone; med gray N-5, w/ fresh faces	
						speckled pale brn. 5YR 5/2, 10-15% silt, mod	
						to well sorted, slt. calc., laminated - faint,	
						slt. petroliferous, spots of bitumenous material	
						on fresh faces, brz. parting planes at	
						1153.62	
1155.86 - 1159.59			CORE 3.5"	100	100	Claystone; olive gray 5Y 4/1, <5% silt, v.	
						well sorted, noncalc, bedding indistinct -	
						possably massive, nonpetroliferous to	
						v. sltly petroliferous - fresh faces v. smooth,	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P 7
DATE 10/29/74 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED L-W Air Rotary Failing 2500
LOGGED BY M. Siembieda

104

RQD

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						no silt grains visable w/a 14x hand lense	
						between 1158.05 & 1158.4 - laminated,	
						parting planes at 1158.4.	
1159.59 -		40	35 CORE	100	100	Claystone - Silty Claystone; med. dk. gray	
1162.45		41				N4 to lt. brnish gray 5YR^{6}/1, 5-10% silt,	
						wellsorteded, noncalc. to slt. calc - alter-	
						nating laminae fizz, laminated - well dev.,	
						slt. petroliferous, hard, parting	
						places at 1160.65 1161.68	
1162.45		41		70	100	Claystone medium light grey N6	
1167.8						and very pale orange 10YR^{8}/2	
						hard to very hard thinly bedded	
						to laminated, color banding	
						poorly sorted, very low silt	
						content, highly calcareous	
						badly fractured between	
						1163.7 → 1165.1 some	
						surfaces are even and regular	
						while others are Rough and	
						irregular, also from 1167.1	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/24/74 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED ~~[illegible]~~
LOGGED BY M Siembieda
L-W Air Rotary Failing 2500
105

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						To 1168.0, fractured zone	
						irregular surfaces, but generally	
						vertical. Some pyrite	
						~~[illegible]~~ in claystone	
1167.80		41		50	100	claystone Olive grey 5Y 4/1	
1173.84						(very uniform color), hard to	
						very hard, very faint bedding	
						but generally appears massive	
						poorly sorted almost no silt	
						very slight calcareous to non	
						calcareous, inclussions of	
						pyrite, and black needle-like	
						crystals. From 1169 to 1172	
						fracture zone at last 4 joints	
						can be seen, they are vertical	
						smooth reggular, 3 occur at	
						60° to each other the 4th	
						is parrallel to another	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-3

DATE 10/29/74 TITLE

ELEVATION DATUM

START COMPLETE

WATER LEVEL AFTER

EQUIPMENT USED L-W Air Rotary Failing 2500

LOGGED BY M. Siembieda

RQD 106

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
117384		41		100	100	Interbedded claystone and	
1183.5						marlstone: Very pale orange	
						10YR 8/2, ~~to~~ dark yellowish	
						brown (10YR 4/2) and greenish	
						grey (5G 6/1) hard (marlstone)	
						to very hard (claystone) thinly	
						bedded to laminated, poorly	
						sorted (almost no silt) moderately	
						to highly calcareous, some	
						fine grained pyrite/mica in	
						rock. Veining is very prevelent	
						especcially in marlstone, where	
						a blue color has stained the	
						[illegible] country rock. Claystone	
						is very brittle and has a	
						hacky fracture. Some distorted	
						beds and minor offsets. Parting	
						Planes at 1178.98, 1180.24	
						1180.34. At 1182.58 a tuffaceous	
						sandstone, oil impregnated (31' thick).	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/29/74 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED L-W Air Rotary Failing 2500
LOGGED BY M Siembieda

107

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
1183.5				100	100	Claystone: Olive grey (5Y 4/1)	
1186.34						very hard, thinly bedded	
						(faint), poorly sorted, (very	
						little silt) non calcareous	
						to very slightly calcareous	
						some veining of unknown	
						material. non-fractured, some	
						fine pyrite/mica, very homogeneous	
1186.34				100	100	Silty claystone, blackish red	5R 2/2
1190.26						hard, thinly bedded, some	
						color banding, silt comprises	
						30% ± 10%, moderate sorting	
						non-calcareous,	
						low oil content, non-fractured	
						parting plane at 1186.79	
						1189.35, some fine grained	
						pyrite/mica. At 1187.75 a ~1'	
						thick zone "tar sand" black N1	
						sticky, soft, friable, high	
						oil content	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/30/74 TITLE
ELEVATION
DATUM
START
COMPLETE
WATER LEVEL
AFTER
EQUIPMENT USED L-W Air Rotary
LOGGED BY M Siembieda

RQD

108

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1190.96		47		100	100	Silty claystone: Dark yellowish	
1193.18						brown (10YR 4/2), dusky yellowish	
						brown (10YR 2/2) hard, laminated	
						(faint bedding) silt content	
						10%-30%, moderate sorting,	
						non-calcareous to very slightly	
						calcareous. Parting plane at	
						1192.21, 1192.45, non. fractured	
1193.18		42		100	100	Claystone Pale yellowish brown	
1196.70						(10YR 6/2) to Moderate yellowish	
						brown 10YR 5/4, very hard	
						laminated, poorly sorted	
						slightly calcareous (dolomitic?)	
						silicious (?), non. fractured	
						At 1194.37 sandstone, black (N1)	
						medium grained, highly porous	
						quartz, Mica, feldspare (?).	
						Claystone is non-fractured and	
						non-fossiliferous	

NOTES:

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/30/74 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED LW Air Rotary
LOGGED BY M. Siembiedu

RQD 109

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1196.70		41		100	100	Claystone: Olive grey 5Y 4/1	
1201.23						very hard, laminated, very low	
						silt content, poorly sorted,	
						non-calcareous, silicious (?)	
						very homogeneus, parting	
						planes at 1198.13, 1198.58	
						1200.95, non-fractured	
1201.23		41		100	100	Marlstone: very Pale orange	
1206.34						10YR 8/2 moderatley hard	
						thin bedded, to Massive,	
						very little silt, poorly sorted	
						very highly calcareous, non	
						fractured, parting planes at	
						1202.03, 1204.76	
						1205.70, 1205.75	
1206.34						Claystone Olive black 5Y 2/1	
1212.78						hard to very hard, (faint	
						bedding) laminated, very	
						little silt, poorly sorted	
						(silicious?) non-calcareous	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/30/74 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED L-W Air Rotary Failing 2500
LOGGED BY M. Siembieda

110

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Cor ~~Blows or Force~~	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1206.34		41				fine-grained pyrite	
1212.78						Parting planes at 1209.25	
cont						non-fractured, very homogeneous	
1212.78				100	100	Tuff Sandstone ~~medium~~ dark	
1212.93						grey N3 hard, very porous	
						massive, fine to medium grained	
						moderately sorted, secondary	
						calcite crystals	
1212.93						Marlstone very Pale orange	
1215.55						10 YR 8/2 moderately hard,	
						thin bedded, possible silt (may	
						be flecks of marlstone	
						"peeling off", highly calcareous	
1215.55				100	100	Claystone: medium dark grey	
1219.16						(N4) hard to very hard,	
						laminated (faintly), non-	
						calcareous, very little silt	
						poorly sorted, (silicious)	
						Parting planes 1219.64	
						1218.24, 1218.83	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-3
DATE 10/30/74 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED L-W-Air Rotary Failing 2500
LOGGED BY M. Siemhiedo

RQD

111

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
1219.16		41		100	100	Marlstone, very pale orange	
1219.36						10 VR 8/2 Moderately hard	
End of						thinly bedded, poorly sorted	
Hole						highly calcareous, non-fossilifero	
						non fractured	
						— END of Hole —	

NOTES:

FUGRO

BORING NO. P-4 Core

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P4 Core
DATE 10/20/74 TITLE Sun Phillips / SOHIO
ELEVATION ______ DATUM ______
START 51.54 COMPLETE 57
WATER LEVEL ______ AFTER ______
EQUIPMENT USED Gardner Denver
LOGGED BY B. Siems

Page 1

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
51.54-						Sandstone, 5Y5/1 to 5Y6/1 Grey, v.f.	
54			RQD	100		grained to silt, non calcar-	
					100	cous (90%) to calcareous (10%),	
						mod. hard, thin distorted	
						laminae at ~30° to horizontal;	
						very round smooth holes (<.01") (vugs)	
						(resemble vesicles) in upper 1';	
						light colors more calcareous (to 53.6')	
						tiny (gen <.01" but to .05') hydrocarbon flecks;	
			PPI, 52.9'; 53.3'			micaceous; qtz; gilsonite	
						stringer <.01' thick;	
			~~P.P.~~ FRACT			52.9 ~ horiz	
						53.3 ~35° not ∥ to bedding	
54-57			RQD	100		Sandstone 5Y5/1-6/1, Grey,	
					100	v.f. grained with silt rare	
						FeOxide, non calcareous 80% to	
						calcareous 20%; 55.4-55.85-	
						calcareous lighter harder bed; mod hard	
						thin deformed laminae ~35	

above horiz to 45° to vert.;

S:

10-2 [illegible]

Fugro

7-23-73 L-01

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10/29/74 TITLE Sun Phillips/SOHIO
START 57-~~68~~? COMPLETE 68?
EQUIPMENT USED

BORING NO. P4 Core
ELEVATION DATUM
WATER LEVEL AFTER
LOGGED BY

Page 2

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
						micaceous, hydrocarbon sparse flakes to	
						.05'	
57-60				RQD	100	Sandstone, as above, laminae	
				Rec.	100	closer to horiz. (60°) less distorted, hydrocarbon	
						stringers to .05' @ 30° to	
						horiz.;	
60-62.9				RQD	100	Sandstone, as above, v.f. grained	
				Rec	100	but coarser above 60.9';	
						contact at 60.9' is very	
						distorted, slightly calcareous,	
62.9-65.9				RQD	100	Sandstone, as above with distorted	
				Rec	100	laminae ‖ to each other and	
						at 40° to horizontal, ‖ to	
						FRACT from 65.6 to 65.9;	
						slightly calcareous	
65.9 to					65.9	to 66.5 as above with ‖ FRACT	
68+?						at 66.5	

NOTES:

10-29-74 [illegible]

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10-21-74 TITLE
START 10-21-74 COMPLETE
EQUIPMENT USED Gardner-Denver. Layne western
BORING NO. P-4 Core
ELEVATION DATUM
WATER LEVEL AFTER
LOGGED BY J. Cranor.

Page 3

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
below	66.5 - to 71.54					~~Sandstone~~ 5Y 6/1 grey, v fine	
			RQD = 0			to fine grained, even grained,	
			Rec = 100?			slightly calcareous micaceous,	
						with hydrocarbon flakes,	
						NOTE: Recovery as chunks	
						from 2" to 6", irregular	
						no bedding noted.	
71.54-91.55		2	RQD	100	20.0/20.0	Sandstone gray 10YR 5/1, grain - fine to	
						very fine, subrounded to rounded non calcareous,	
		71.54-81.54, - RQD=100				bedding - not destinguisable, few carbon and	
		81.54-91.55, RQD=100				plant fragments.	
						Fractures:	
						location Atitude Location	Atitude
						74.1' Horiz 82.85'	Horiz.
						77.9' Horiz 84.4'	Horiz
						80.8' Horiz 85.85	Horiz.
						81.6' Horiz 87.25'	Horiz
						82.2' Horiz 87.50'	30°
						82.44 Horiz 87.85	Horiz

88.1 Horiz

NOTES: 89.0 Horiz

10-21-74

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-088
DATE 10-21 TITLE Sun Phillips
START 10-21 COMPLETE
EQUIPMENT USED Layne Western
Gardner Denver 2000

BORING NO. P-4 Core
ELEVATION DATUM
WATER LEVEL AFTER
LOGGED BY J. Craver

Page 4

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
91.55-104	3		Core		20.00/20.07	Sandstone Gray 10YR 6/1, Fine to	
		RQD 100				very fine, grain shape not	
						distinct, well sorted, cementation	
						silica(?) and calcite, moderately	
						calcareous. Some carbonized	
						plant remains; bedding is	
						not visible.	
104-107.5						Sandstone Same as above and	
						but shows irregular bedding	
						alternating from gray to dark	
						gray.	
107.5- [illegible]							
111.55						Sandstone Same as above	
						with no apparent bedding.	
						fracturing due to drilling	
						or removal from core barrel.	

NOTES:
[illegible]

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068

DATE 10-21-74 TITLE Sun-Phillips

START 10-20-74 COMPLETE

EQUIPMENT USED Layne Western
Gardner Denver 2000

BORING NO. P-4 core

ELEVATION DATUM

WATER LEVEL AFTER

LOGGED BY J. Granor

Page 5

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
111.55' —	#	4	Core		20.0 19.9	Sandstone, gray 7.5YR 5/0, fine,	
131.55'						grain shape not determined, well	
						sorted, cementation - silica ?, Compaction,	
						Calcareous - Slight to none, hard,	
						Bedding irregular subparallel,	
						inclined 20°-30° to core.	
						Fossils throughout run.	
						occasional occurrences of	
						carbonized plant fragments and	
						small spots of hydrocarbons.	
						@ 118.4' <2" small irregular shaped patch of fine	
						calcite crystals, subhedral, and	
						a phylosilicate mineral, illite?,	
						subhedral to euhedral. Horizontal	
						fractures caused by drilling	
						or removing core from barrel.	
						No parting stains observed.	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P4 Core
DATE 10/21/71 TITLE Sun Phillips 150H10
ELEVATION ______ DATUM ______
START 131.55' COMPLETE 134.4'
WATER LEVEL ______ AFTER ______
EQUIPMENT USED Gardner Denver 2000 Layne Western
LOGGED BY B. Siems
Pag 6

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
131.55-		5	Core		19.88	[Sandstone 10 YR5/1-6/1, mottled	
151.55					20'	grey; v.f. grained, well sorted,	
		RQD=		3.5" 20'	98%	cementation: silica?, slight clay & slt;	
				131.55- 134.4		hard; non calcareous to slightly	
						calcareous; distorted thin laminae	
						to thin beds, at 10° to 40° to horizontal;	
						infrequent flecks to small "~~[illegible]~~ spots" of hydrocarbons	
						to .4"; some minor pyrite with hydrocarbons;	
					FRACTS. or	Mechanical breaks prior to	
						Removal from barrel at:	
						133.85 138 141.54	146.3
						134.4 139.25 141.9	146.8
						135.09 139.67 143.1	148
						136.61 ~~139~~ 140.09 144.95	150.7
						137.87 140.46 146	150.96
							151.55
					All	are sub horizontal & at angles to	
						bedding unless noted.	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10/21/74 TITLE Sun Phillips / SoHio
START 134.4 COMPLETE 140.09
EQUIPMENT USED Layne Western
Gardner Denver

BORING NO. P4 core
ELEVATION ______ DATUM ______
WATER LEVEL ______ AFTER ______
LOGGED BY B. Siems
P. 7

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
134.4-		5			100%	Sandstone same as above to	
137.15				RQD	100%	~136.5', ~~bedd~~ laminae nearly horiz. (<10°)	
						134.75 to 135.3 -moderately calcareous;	
						hydrocarbon spots v.thin (<< 1/10"), to .5" in	
		Box	31			length;	
						136.5-137.~~5~~ Sandstone between 7.5YR5/-	
						6/1; grey to pinkish grey; v.f. grained-f.gr.	
						& mod. well sorted-; hard; mod. calcar-	
						eous to non-calcareous; darker convoluted	
						(35° to horiz.) laminae-finer grained; hydrocarbon flecks;	
						137-more even Sandstone v.fine grained	
						as before & nearly horizontal thin	
						bedding	
137.15-		5			100%	Sandstone similar to above:	
140.09				RQD	100	between 2.5Y6/1 & 6/2; grey & yellowish	
		Box	32			gray; v.fine grained to 138.35, fine grained	
						to 140.09; well sorted; non calcareous to	
						slightly calcareous; thin laminae to	
						(above 139.25), thinly bedded, slightly uneven to distorted	
						(below 139.25); hydrocarbon flecks & stringers	

aligned with bedding; between 138.35

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10/21/74 TITLE Sun Phillips/Sohio
START 140.09' COMPLETE
EQUIPMENT USED Layne Western
Gardner Denver

BORING NO. P-4 Core
ELEVATION DATUM
WATER LEVEL AFTER
LOGGED BY B. Siems
P.B

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						and 139.25-massive unit with hydrocarbons	
						showing no preferred orientation;	
140.09-					100	Sandstone as above; to 141.9 relatively	
142.1				RQD	100	even bedding & laminations at up to	
			Box #33			20° to horizontal; below 141.9-very	
						irregular thin beds-to .2"-light dis-	
						continuous very calcareous units separating	
						non calcareous grey units; ~142.8-last	
						calcareous unit; hydrocarbon flecks &	
						stringers minor & irregularly distributed;	
142.1-					100	Sandstone as above; to ~142.5 has	
146			RQD		100	calcareous beds like between 141.9 &	
			Box #34			142.8; thin beds and laminae irregular	
						& convoluted, to 60° to horizontal, more	
						frequently 30°-40°; below 145.9-~~pyrite~~ mica	
						& calcite concentrations;	
~145-146					—	siltstone 5YR 6/1-6/2; pinkish grey;	
						well sorted; cement-some calcite	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10/21/74 TITLE Sun Phillips
START 146' COMPLETE
EQUIPMENT USED Layne-Western
Gardner Denver

BORING NO. D-4 Core
ELEVATION DATUM
WATER LEVEL AFTER
LOGGED BY B. Siems
Page 9

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						laminae & bedding as above;	
						hydrocarbon flecks absent;	
						~~pyrite~~ mica & calcite concentrations	
146-149.3					2.97/3.0	Siltstone 7.5YR5/2 brownish grey;	
			RQD		2.8/3.0	wellsorted; cementation-silica? &	
			#35			compaction?; hard; non calcareous;	
						massive; mica & calcite concentra-	
						tion at 147.21, 146.2, hydrocarbon	
						flecks (~.01") scattered;	
CORE 6	151.55-171.55					Recovery ~18/20 RQD 16.85/20	
149.3-						Siltstone 10YR6/2-7.5YR6/2	
152.15						lt. brnish gry-pinkish gray; well sorted,	
			#36			slightly calcareous to non calcareous;	
						150.57-mica pyrite & Calcite Concentration;	
						to 150.57-laminae at 60°-70° with horizontal;	
						below, laminae sub horizontal;	
						151.55-152.15-finer;	

missing 1.5 there

NOTES:

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10/21/76 TITLE Sun Phillips
START 152.15 COMPLETE 155.1
EQUIPMENT USED Gardner) Denver-
Layne Western

BORING NO. P4 core
ELEVATION ______ DATUM ______
WATER LEVEL ______ AFTER ______
LOGGED BY B. Siems

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
CORE		6	:	P.P		151.85, 152.15, 152.45, 153.5,	
						154, 155.64	
						156.25 (F?)	
						156.99	
						158 (F?), 158.7 (mB?), 159 (F?), 159.4 (F)	
						159.65 (F), 160.15, 160.97	
						161.95, 162.3, 162.8 (F) (11 Bed?),	
						163.35, 164.35, 164.9 (F), 163.5 (F 1 Bed);	
						166, 166.75 ?; 167.3 (F?), 168.12 (F),	
						168.75 (F), 169.25 (Sub 11 bed.).	
152.15 - 155.1				RQD=100		Siltstone 5YR6/1, pinkish gray;	
				Rec. =100		well sorted; non calcareous (90%) to	
			Box 37			slightly calcareous (10%),	
						hard, v. finely laminated - variegated	
						with red brown to grey laminations,	
						even beds - slightly undulating, nearly	
						horizontal, hydrocarbon needles	
						Grades into SS ~154.8	

NOTES:

FUGRO

7-23-73 L-

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10/21/74 TITLE Sun Phillips
START 155.1 COMPLETE 160.97
EQUIPMENT USED Gardner Denver Layne Western

BORING NO. P4 core
ELEVATION ______ DATUM ______
WATER LEVEL ______ AFTER ______
LOGGED BY B. Sems

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
155.1-				Rec	100	Silty Sandstone with siltstone	
158				RQD=	100	bed 155.3- 155.75; 10R5/1	
						reddish gray; cementation-	
						compaction; v. thinly laminated	
						where bedding visible ~~(155.3-155.75,~~	
			Box	38		~~156.4, 156.9)~~; subhorizontal (155.3-155.75,	
						156.4, 156.9), 155.75-156.25 ~25° to horiz.;	
						minor gilsonite stringers, hydrocarbon beds	
						156.4 & 157; below 157-massive	
158-160.97				Rec	100	Sandstone with siltstone beds ~159.2 &	
				RQD	32.5/35.5	reddish grey to pinkish grey 159.4; 10R6/1 to 10R5/1; v. fine	
			Box	39		grained; hard; noncalcareous,	
						massive above 158.75; v. thinly laminated	
						below 158.75; laminations subhorizontal,	
						minor, scattered hydrocarbon plates	
						& stringers ǁ to sub ǁ to bedding;	
						mildly undulating beds; ~~non~~	
						pod of calcite at 158.2; pyritiferous	
						bed at 159.6	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-1068

BORING NO. P4 cor

DATE 10/22 TITLE Sun Phillips

ELEVATION ________ DATUM ________

START ________ COMPLETE ________

WATER LEVEL ________ AFTER ________

EQUIPMENT USED Gardner Denver

LOGGED BY B. Siens

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DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
160.97-					100	Sandstone, 10YR6/1, grey, v.f. grained,	
164				RQD	100	wellsorted; silt & silica cement?; hard,	
			Box	40		non calcareous to slightly calcareous,	
						v. thinly laminated, sub horizontal to	
						15° with horiz, undulating; micaceous	
						(biotite) & minor hydrocarbon flecks & plates;	
164 - 166.75					100	Sandstone similar to above, ~164.9	
				RQD	100	bedding angle changes to 35°-50°;	
						laminae are irregular, distorted;	
			Box 41			hydrocarbons present as flecks, to	
						patch ~1" diameter; ~166.6 laminae	
						contain more red grey Siltstone	
166.75-						Sandstone with siltstone, similar to	
169.6						above; ~~beds~~ laminae are ~~25°~~ 15-25° to horiz;	
						gilsonite ~~patch~~ layer at 169.25; non	
			42			Calcareous; Siltstone is thin laminae	
						(to ~1") in SS; laminae are discontinuous	
						& deformed;	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P4 core

DATE 10/21/74 TITLE Sun Phillips

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED Layne Western
Gardner Denver

LOGGED BY B. Siems
P. B

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
169.6-				RQD	=0	Sandstone with siltstone -	
171.55				Rec	7	same as above,	
						but returns are fragmented	
CORE	7		171.55	-191.55			
					Recovery 20.3/20		
					RQD = ~~100~~ 98		
		Probable		that		extra core belongs to previous	
		run -		will		label depths on that assumption	

FRACTURES			PARTING PL.
173.36	176.8		185.3
174.08	177.85		186.02
174.25	178.35	181.75	186.8
175.55	179.45	182.15	187.75
176.05	179.85	183	188.2
176.45	180.85	183.9	188.7
		184.4	190.9
		184.75	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P4 core

DATE 10/21/74 TITLE Sun Phillips

ELEVATION ____ DATUM ____

START ____ COMPLETE ____

WATER LEVEL ____ AFTER ____

EQUIPMENT USED Gardner Denver
Layne Western

LOGGED BY B. Siems

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
171.55- 173.36						Sandstone as above; distorted laminae, from nearly horizontal to 40°; bedding dips in opposite directions - one ~20°; ~~lower~~ upper ~40°;	
173.36- 176.3						Sandstone as above; grey, v. fine grained, well sorted, hard, non calcareous, thinly laminated to apparent massive; ~~&~~ laminations distorted, sub horizontal to ~20°, micaceous (biotite) & hydrocarban flecks	
176.3- 179.2						Sandstone as above; reddish gry bedding more even - parallel to itself, gently undulating to even, ~20° to horiz or less; finer grained; micaceous	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P4 core
DATE 10/21/74 TITLE San Phillips
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED Gardner Denver- Layne Western
LOGGED BY B. Siems

Page 15

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
179.2-					100	Siltstone - Sandy -	
181.75				RQD	100	as above to 179.6;	
						179.6 - Siltstone 5YR 4/1	
						dark grey, reddish caste; hard	
						~~thin to~~ calcareous; variegated -	
						v. thinly laminated, more even & thinner	
						than previously, thinner; —not distorted;	
						~181.5 - becomes redder; less calcareous	
						dark laminae ~every inch;	
						Parted during description 181.75;	
181.75-						Siltstone as above - dark grey	
184.75						with red caste; hard, sl. to mod. calcareous, v. thinly laminated -	
						thinner than previous Sandstone;	
						very even beds, ~~har~~ ~~slightly~~ not deformed,	
						shades of reddish grey to grey;	
						micaceous	
184.75-						Siltstone 5YR 4/1 - 5YR 3/2; dk gry to	
187.75						dk reddish brn; calcite; hard	
						mod. calcareous; laminated as above, rare und. beds	
						micaceous; rare hydrocarbon flecks;	

NOTES:

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. D 4 [illegible]
DATE 10/21/74 TITLE Sun Phillips
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED Layne Western Gardner Denver
LOGGED BY B. Siems

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
187.75-						Siltstone same as above;	
190.75						mod. to v. calcareous, red brown;	
						v. fine laminated;	
						New Partings 190.4, 1~~90.25~~	
190.75-						siltstone, dark reddish gray 10R 4/1	
191.55						mod Calcareous hard, [illegible]	
						thinly laminated. no parting.	
191.55-					20.0/20.0	Siltstone Same as above,	
200.65			RQD			bedding not ~~[illegible]~~ visable.	
			97				
200.65-						Sandstone and Siltstone bed.	
200.85						.2' thick. dark gray 7.5YR 4/0,	
						ss medium grain, mod. hard,	
						non calcareous, ~~w~~ thinly	
						bedded, siltstone same color	
						and hardness as ss.	

NOTES:

FIELD LOG OF BORING

PROJECT NO. 74-088

BORING NO. ' P-4 core

DATE 10-22-74 TITLE

ELEVATION DATUM

START COMPLETE

WATER LEVEL AFTER

EQUIPMENT USED Layne Western
Gardner Denver.

LOGGED BY Craver

P-17

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
203.75-						Sandstone, dark gray, 0.1'	
203.85						thick, hard, mod to Strong	
						Calcareous, bedding surfaces,	
						parallel.	
204.0-						Siltstone, gray 5YR 5/1, hard,	
211.65						moderately Calcareous, fine grained,	
						thinnly laminated ~~to~~ ~3 mm to	
						10mm. parallel but wavy.	
						Some Vertical fracturing at	
						at 204.6' and 205.7'	
						206.6 bedding is uneven	
						and pod-like, algae deposits?	
						206.7 and 207.6 horiz. frx.	
						Note; grease from coar	
						barrel on core in several	
						places.	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

DATE 10-22-74 TITLE Sun Phillips

START 10-20-74 COMPLETE

EQUIPMENT USED Layne Western

Gardner Denver 2000

BORING NO. P-4 Core

ELEVATION DATUM

WATER LEVEL AFTER

LOGGED BY J. Crann

P-18

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
211.75 —					$\frac{20.0}{20.0}$	Siltstone, dusky red 10R 3/2;	
231.75			RQD	100		fine grained; well sorted; hard;	
						slightly calcareous; ~~Varving~~ Varved or	
						thin lamanation through out entire	
						run; vertical fracturing forming	
						small thin splinters 222.95'	
						; Sandstone bed;	
						gray; medium to fine grain;	
						well sorted; hard; 0.15' thick;	
						sharp contact at. 228.8 ft.	
						non calcareous. Several	
						mecanical caused fractures	
						~~bit~~ from drilling and from	
						removal of core from barrel	
						are present, no parting	
						plains	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-4 Core
DATE 10-22-74 TITLE
ELEVATION DATUM
START 10-20-74 COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED Layne Western
Gardner-Denver 2000
LOGGED BY J. Cranor
P-19

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
231.75 –			C		20.0/19.9	siltstone, gray 10YR 5/1,	
239.9			RQD	100		fine to very fine grained,	
						well sorted, calcite cementation;	
						hard; slightly to moderately	
						calcareous, bedding is thinly	
						varved. at 234.1' small	
						vertical displacement in beds(	local
						condition). @ 234.5' and	
						234.9' two beds 0.1" thick	
						composed of what looks to	
						be a mica, illite?, several	other
						smaller beds occurre in the	
						intraveral. small eliptical	
						patches ≃ 1-3 mm long	
						of silica? are also present.	
239.9-						siltstone, very dark grayish brown 10YR 3/2	
242.4						to black 10YR 2/1, fine to	
						very fine, well sorted, non calcareous	
						hard petroliferous,	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10-22-74 TITLE
START 10-20-74 COMPLETE
EQUIPMENT USED Layne Western
Gardner Denver.

BORING NO. P-4 core
ELEVATION DATUM
WATER LEVEL AFTER
LOGGED BY J. Craner

P-20

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
239.9 -	(Cont)					bedding is varved and some-	
242.4						what undulatory with several	
						small inclusions of medium	
						grained sandstone which are	
						lense shape & about 0.1" thick.	
						Has strong Petroliferous odor.	
242.4 -						Siltstone, very dark gray,	
251.75						5YR 3/1 grading to dark	
						gray 10YR 4/1 very fine grain,	
						well sorted, calcite cementation	
						hard, ~~varved~~ thinly laminated.	
251.75 -					20.0 / 20.0	RQD = 95%	
271.75			Parting			Planes	
						253.1 259.5 265.55	269.2
						257.3 261.4 267.7	269.5
						257.82 262.67 268.2 Lith. Chge	270
						258.62 263.55 268.6	270.3
						259.08 264.5 268.85	270.7

Below 267.7 Planes undulate, but still appear to parallel bedding;

270.8
271.3

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P4 core
DATE 10/21/74 TITLE Sun Phillips
ELEVATION _____ DATUM _____
START _____ COMPLETE _____
WATER LEVEL _____ AFTER _____
EQUIPMENT USED Layne Western Gardner Denver
LOGGED BY B. Siems

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
250.95-				RQD=	100	Siltstone -shale 7.5YR 4/2 - 3/2 dark	
254				Rec =	100	brown with black caste; calcite	
						cement; v. fine hard; v. calcareous to	
						slightly calcareous; v. finely	
						laminated (<<.1") - shades of	
701						red brown to black; most beds	
						very even & continuous; mechanical	
						breaks occur on bedding planes	
254-257				RQD=	100	Siltstone -shale - Same as above; v ~~255~~ 256.5 -	
				Rec =	100	beds pinch & are slightly irregular;	
702						hydrocarbon fleck;	
257-260				RQD =	100	Siltstone with sandstone - highly variable	
				Rec =	100	257.3 - same as above	
703						At 257.3 - Sandstone, .2' thick; 7.5YR 7/1,	
						v. fine grained; v. biotitic; non calcareous	
						257.3 - 260 - siltstone as above interbedded	
						with sandstone; Sandstone is less	
						regularly laminated, sometimes	

deformed into pods; siltstone laminae

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10/22 TITLE Sun Phillips
START ______ COMPLETE ______
EQUIPMENT USED Gardner Denver
BORING NO. D4 core
ELEVATION ______ DATUM ______
WATER LEVEL ______ AFTER ______
LOGGED BY B. Sims

Page 22

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						within SS are discontinuous;	
						unevenly calcareous;	
						below 259.4 - bedding laminae become	
						very even, regular siltstone again; to	
						260.5	
260-263						Siltstone -shaley as above to 260.5	
						below 260.5 to 261.4 siltstone interbedded	
						with Sandstone; light grey to white SS;	
7~~8~~4						v. fine grained; well sorted; some calcite	
						cement; hard; deformed undulating beds	
						.02' to .15' thick; unevenly calcareous;	
						25% pyrite; quartz;	
						261.4-263 - siltstone - red grey	as above
263.01-						Siltstone -shaley as above - red grey, v. fine,	
264.5						v. evenly & thinly laminated, essentially	
						undeformed horizontal bedding,	
75						rare gilsonite plates to 1"; unevenly	
						calcareous; rare thin (.01'-.05')	sandstone
						laminae; also rare thin (<.01')	black
						petroliferous laminae	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068 BORING NO. P4 core

DATE 10/22 TITLE Sun) Phillips ELEVATION ____ DATUM ____

START ____ COMPLETE ____ WATER LEVEL ____ AFTER ____

EQUIPMENT USED Gardner Denver LOGGED BY B Siems

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						264.3 - gilsonite layer	
						264.3 - 264.4 - oil shale - ~~b~~ siltstone petroliferous	
						smell, red brown to 10R3/1 dark	
						reddish grey; hard; slightly calcareous,	
						v. thinly & evenly laminated;	
						petroliferous laminae occur in decreasing	
						amounts to 264.8; sandstone interbeds	
						≯0.1'; deformed bedding near SS &	
						siltstone stringers have been raised	
						& incorporated into SS;	
						264.8 - 265 high angle deformed siltstone	
						laminae (~40°)	
						265 - 265.55 - siltstone - brownish grey,	
						micaceous, with some gilsonite & hydro-	
						carbons; similar to previous (264-264.3),	
						v. thinly & evenly laminated.	
265.55 -						Sandstone 10YR 7/1 light grey (very); very	
266.7						fine grained; well sorted; some calcite;	
						hard; slightly calcareous; massive, but	
266-269 #76						with sub horizontal discontinuous thin	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10/22 TITLE Sun Phillips
START ____ COMPLETE ____
EQUIPMENT USED Gardner Denver

BORING NO. P4 core
ELEVATION ____ DATUM ____
WATER LEVEL ____ AFTER ____
LOGGED BY B. Cien

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						red brown Siltstone laminae; hydrocarbon patches;	
				266.7-267.7			
						siltstone-shale-5YR 3/1-dark grey with	
				100	%Rec	red caste; v. slightly calcareous;	
Box 76				100		v. finely laminated, infrequent SS to	
			RQD			.15'; as before - SS is deformed &	
						deforms nearby siltstone laminae;	
						otherwise siltstone is very even &	
						undeformed;	
			267.7-269				
269-271.75					}	Sandstone between 2.5Y8/1 & 8/2 with black	
						flecks gen <<.01'; v. fine grained; well	
RQD= ~33%		Rec=100%				sorted; poorly cemented - ± porous ± relative	
						to previous core; hard; non calcareous	
Box 77						except ~268.5; massive, except ~268.5;	
						268.5-thinly laminated, distorted	
						laminae, of petroliferous siltstone,	
						zone .02'; also sim. at 269.2';	
						becomes indistinctly thinly bedded	

below 270;

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P4 cont
DATE 10/22 TITLE Sun Phillips
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED Gardner Denver
LOGGED BY B. Ciens

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						tuffaceous; micaceous; hydrocarbons as flecks or plates aligned with bedding & concentrated in some laminae	

271.55 - 291.55 Recovery 19.7/20 RQD=100

Parting Planes		FRACTURES
272.5	~~278.65~~	274.35
272.8	282.88	275.6
273.1	283.23	277.6
275.1	283.75 (after removal)	279.66
275.95	284.5	280.45
276.25?	286.2	
276.8	288.1	
277.1	289.1	
~~281.~~278.65	289.5	
281.76	290.8	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10/22 TITLE Cien) Phillips
START ______ COMPLETE ______
EQUIPMENT USED Gardner Denver)

BORING NO. P4 con'd
ELEVATION ______ DATUM ______
WATER LEVEL ______ AFTER ______
LOGGED BY B. Cien

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
271.75-					100	Sandstone - 7.5YR 6/2-5/2 with	
274.75				RQD	100	7.5YR 8/6 ~~irregular layers~~ discontinuous layers;	
						very fine grained, well sorted,	
#78						hard, v. slightly calcareous, thinly ~~massive~~	
						bedded; micaceous & contains minor hydro-	
						carbon plates;	
						Dark red brown petroliferous shale	
						beds at 273.15 (.1' thick) and	
						273.75 (.03' thick); thinly laminated,	
						undulating, ~10° to horizontal	
274.75-						Sandstone as above to 275.1	
277.6						Interbedded Sandstone & Siltstone	
						approx. half & half;	
#19						275.2 begins ~~[illegible]~~ petroliferous siltstone	
						grading irregularly into sandstone at 275.9;	
						siltstone is dark grey to reddish	
						yellow variegated; hard, non-calcareous	
						to slightly calcareous; v. thinly laminated,	
						laminae are irregular, wavy, discontinuous,	

TES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068

DATE 10/22 TITLE Lien Phillips

START ______ COMPLETE ______

EQUIPMENT USED Gardner Denver

BORING NO. P4 core

ELEVATION ______ DATUM ______

WATER LEVEL ______ AFTER ______

LOGGED BY B. Lien

P. 27

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
						petroliferous mat'l concentrated	
						in upper .1'-diffuse below that;	
						Below 275.45-Sandstone with ~~zones~~ laminae where	
						hydrocarbon beds are more concentrated;	
						rare thin discontinuous siltstone	
						laminae; micaceous	
277.6- 279.7			Box 80			Sandstone as above (below 275.45)	
279.7-280.45				Rec	100	Siltstone & Sandstone very finely	
				RQD	100	interlaminated; siltstone is red brown,	
						sandstone light pinkish grey; sandstone	
						is carbonaceous, siltstone less so;	
						very fine grained;	
						contact at 279.7 shows flow distortion	
						at time of deposition or soon after;	
280.45- 286.2 Boxes 81-82					RQD=100 Rec=100	Siltstone-shaly; 7.5YR5/2 brown (with reddish caste) mud cement probably; v. slightly calcareous to non	

NOTES:

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P4 core
DATE 10/22 TITLE Sun Phillips
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED Gardner Denver
LOGGED BY B. Siems

Page 29

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
292.3-						Siltstone shaly same as 286.2, only	
294.15						1 sandstone layer, at 292.8	
294.15-						Sandstone - 7.5YR5/2; brown;	
295.3						v. fine grained & silty; silt-some	
						clay?; hard; non calcareous;	
						thinly bedded to laminated-	
85						highly deformed, to nearly	
						horizontal, not distinct	
						NAHCOLITE & CALCITE CAVITY @	
						295.3 - 295.5, 295.6 - 296	
295.3-						Sandstone - as above to 296	
298.25						296 - 297.6 - sim to above with	
						plastically deformed blebs & stringers	
						of shale - red brown - surrounded by	
86						halos of pyrite - v.f. grained; v. tiny	
						to ~.1"; also minor hydrocarbon stringers	
						& flecks	
					297.6 - 297.8 SS with small (~.01") calcite &		

nahcolite crystal groups; bottom of bed inclined ~15-20°; hydrocarbons;

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

DATE 10/22 TITLE Sun Phillips

START ____ COMPLETE ____

EQUIPMENT USED Gardner Denver

BORING NO. P4 core

ELEVATION ____ DATUM ____

WATER LEVEL ____ AFTER ____

LOGGED BY B. Sims

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						calcareous; very thinly laminated,	
						even laminations, not distorted,	
						some beds pinch, most are continuous;	
						between 283.4 & ~283.8 - ~~sa~~ calcite	
						alike - snakelike form;	
286.2-					100	Siltstone shaly 7.5YR 3/2 dark brown;	
289.1				RQD	100	cementation: clay, some calcite;	
						hard; v. slightly calcareous to mod	
Box						calcareous, v. thinly & evenly	
#83						laminated; some beds to .1' some interbedded sand	
						laminae; beds distorted near sand,	
						otherwise not; some gilsonite stringers;	
289.1 —				Rec	~95	Siltstone shaly, with sandstone Same as above, but black	
292.3				RQD	100	v. thin petroliferous laminae becoming	
						more frequent; 290.6-.7 to 290.7; quite dark;	
Box						NAHCOLITE CAVITIES - 289.5 & 290.8	
#84						with calcite; ~.3' diameter;	
						also 292.3	
						v. irreg. calcite pods stringers 291.8 & 292 —	

91'3" FRACTURES ~horiz 306.1 PARTING PLANES

NOTES: 295.7 300.2 303, 303.5 301.5 & 294.15

297 300.5 304.45 308.2 295.3

298.25 301.5 305 308.8 ~~297~~

298.2 298.8 299.4 302.5 305.4 309.3 311.7

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10-23-74 TITLE
START COMPLETE
EQUIPMENT USED Layne Western

BORING NO. P-4 core
ELEVATION DATUM
WATER LEVEL AFTER
LOGGED BY

Page 30

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						to 298.15 - siltstone	
						then Sandstone tuffaceous? to 298.25, v. fine	
						grained, micaceous, hydrocarbon	
						flecks;	
298.2 -						Sandstone as above; clayey; lt.	
301.3 - 309.5						pinkish grey, v.f. grained; non calcareous,	
#87						hard; very indistinct bedding - ~~may have~~	
#88						~~solution stains~~ - oval - ~.2';	
#89		307				still inclusions of shale with halos;	
#90 307.-309.9						infrequent plates & flecks of hydro-	
						Carbons - horizontal to 45° to vert.; micaceous	
				300.5 → lime bed-		305-305.4 - very contorted silt interbedded	
				v. light gry; ~.1'; very		with ss - vertical beds continuous	
				even grained;		with horizontal;	
						309.7 - contorted white clayey zone	
						with pyrite, magnetite & unknown black	
						needlelike min; banded as though white	
						leached as metallics deposited;	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-4 Core
DATE 10-23 TITLE Sun Phillips
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED Layne Western
LOGGED BY J. Craner

P-31

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
311.5'–					19.8 20.0	Sandstone, Tuffaceous, light gray;	
[illegible]'						fine grained; moderately to	
313.35						well sorted; Silica cement ?;	
						hard to very hard, non calcareous;	
						~~bedding indirect~~, Horiz fracture	
						at 312.8', ±313.1 Small, ~1mm or less,	
						dark colored needle shape minerals,	
						amphibole or pyroxene ?, deformed	
						bedding from 312.8 to 313.35	
						<1" thick, material possibly	
						reworked lucustren deposited?.	
313.35–						Siltstone, dark gray; very	
315.25						fine grained; well sorted;	
						silica and $CaCO_3$ cementation(?); very	
						hard; moderately to slightly	
						Calcareous, Thinly laminated	
						w/ graded Ss bed 0.2" thick @	
						314.6' frx. at 314.4' ~~frx~~	
						~~315~~	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-4 core

DATE 10-23 TITLE

ELEVATION DATUM

START COMPLETE

WATER LEVEL AFTER

EQUIPMENT USED Layne Western

LOGGED BY J. Cranor

P-32

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
315.25 —						Sandstone, brown, fine grained,	
315.55						well sorted, hard, $CaCO_3$ cmt?	
						slightly calcareous, one small	
						arcuate shaped fracture,	
						grains possibly quartz.	
5.55 —						Siltstone same as from	
315.8'						313.35 to 315.25'. A 0.4"	
						brown sandstone bed with	
						wavey surfaces occurs at	
						315.7'	
315.8						Siltstone reddish gray,	
316.0						very fine, well sorted, calcite	
						cement, hard, slightly calcareous,	
						highly porous w/ ~~[illegible]~~	
						oil bleeding from intersticial	
						voids.	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10-23 TITLE
START COMPLETE
EQUIPMENT USED
BORING NO. P-4 Core
ELEVATION DATUM
WATER LEVEL AFTER
LOGGED BY Cranon, J.

P-33

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
316.0 –						Siltstone, very dusky red, v.f.	
321,3						grains; well sorted, calcite	
						cement? hard, slightly Calcareous,	
						frx at 318.75 and 321.3, Horiz.	
						thinly laminated, Two thin	
						Ss bed, ~.2" thick at 316.15	
						and 317.0 like those described	
						at 315.8	
321.3 –						Siltstone very dusky red, like	
321.5						that above but. contains	
						many euhedral and sub hedral	
						crystals of calcite some other	
						translucent mineral. Horiz	
						frxs, on both sides of	
						Zone.	
321.5 –						siltstone like at 316'.0, frx	
[illegible]						at 322.65' with calcite XLs, frx at	
331.6						323.5, 325.15, 326.15, 327.5	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-~~4~~ Core

DATE 10-23 TITLE

ELEVATION DATUM

START COMPLETE

WATER LEVEL AFTER

EQUIPMENT USED

LOGGED BY Cravon, J.

P-34

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
321.5 —		cont.				frx. at 328.7 has more Calcite	
331.6						XLs, also 328.9, frx 329.1,	
						329.6, 329.8, 330.0, all	
						frxs above are horiz.	
						Siltstone is thinly varved.	
331.6 —		RQD =	$\frac{4.4}{19}$		$\frac{19.0}{20.0}$	Siltstone, dark reddish gray,	
[illegible]			⇓			grains: fine to v.f., well sorted	
334.1'			.232			Cement - silica + calcite?, very	
						hard, slightly Calcareous,	
						Very thinly laminated to with a	
						very thin bed of siltstone @ 333.15 ~~[illegible]~~	
						horiz. frx. @ 331.6, 331.35, 332.15	
						332.6, 332.85, 332.95, 333.45	334.3
						At 334.35 to 334.55', is a	porous
						bed of Calcite XLs and marcosite	and pyrite
						The bed is quite porous + vugy.	
						FeS2 XL are small < .1 mm, CaCO3 XL	
						are ≤ 2mm.	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-4 core

DATE ______ TITLE ______

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED ______

LOGGED BY Cranor

P-35

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
334.1 –						Tuffacious siltstone, Lt. gray to	
334,45						gray; fine to v.f. well sorted	
						cement – Calcite, hard, mildy	
						calcareous, Thinly bedded,	
						contains some small ~~[illegible]~~	
						crystals of pyrite and ~~and~~	
						needles of amphebole or pyroxen	
						FeS2 shows a small ~~an~~ alteration halo	
334,45 –							
339.1						Siltstone, dark gray; fine	
						grained, well sorted, calcite	
						cement, hard to very hard,	
						moderatly calcareous; thinly	
						laminated, very thin lenses ~~at~~ beds of	
						hydrocarbon, @ 337.75' a 2,3"	
						bed of dark gray Ss containing	
						some hydrocarbons. at 338.75'	
						an other Ss bed 0,4" thick.	
						@ about 338.6' to 338.8' a gradual	
						increase in hydrocarbon content	

occurres.

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-4 Core

DATE ______ TITLE ______

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED Gardner Denver

LOGGED BY Craver

P-36

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
339.1 –						siltstone and ~~[illegible]~~ coarse	
339.35						quartz sand grains, dark gray	
						to black (wet). siltstone is	
						subround poorly sorted, fine to very fine grained, quartz	
						is coarse and makes up about	15-20 %
						~~[illegible]~~ % of the rock ~~about~~ 30 %	is
						composed of flat, elongate shaped	
						grains and crystals of calcite	
						This zone is laminated and	
						contains many interstitial	
						voids.	
339.35 –						siltstone, dark dusky red	
346.75						grading to brown and pinkish	
						gray laminations, grains are	
						very fine and well sorted	
						calcite cement, very hard to	
						hard, very slightly calcareous,	
						laminated becoming thinly	
						laminated with depth.	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 77-068

BORING NO. P4 Core

DATE

TITLE

ELEVATION

DATUM

START

COMPLETE

WATER LEVEL

AFTER

EQUIPMENT USED

LOGGED BY Cramer

P-37

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
339.35		Cont.				At 345.60' to 345.80' Small	
346.75						calcite crystals jacketed by	
						marcosite occure in the siltstone,	
						when removed they leave small	
						rounded cavites behind.	
						The siltstone is as above	
						frxs. both horiz and inclined	
						are found the former to	
						dominant. 340.9', 341.0'	
						341.5', 341.95, 342.2, 342.8,	
						343.3, 343.5, 343.6, 343.65,	
						343.9, both horiz and inclined at	70°
						to horiz, 344.2, 344.35,	
						344.65 horiz and inclined 75°	
						up for 4", 345.0, 395.90'	
						345.8, 346.0, 346.5 and	
						346.6' from 343.3 to	
						343.6 much of the core is	
						broken into small fragments.	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE ____ TITLE ____
START ____ COMPLETE ____
EQUIPMENT USED ____

BORING NO. P-9 Core
ELEVATION ____ DATUM ____
WATER LEVEL ____ AFTER ____
LOGGED BY Cranor

P-38

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
346.75						siltstone, very dark brown,	
[illegible]						fine grained - v.f. grained,	
350.5						sorted, well sorted, calcite	
						cement, hard - very hard,	
						slightly calcareous. The	
						entire section is composed	
						of small bands of interconnecting	
						voids some filled with calcite	
						and occasionally pyrite or marcasite	
						This appears to be the water	
						producing horizon. Areas	
						around voids are wet after	
						1 hr 15 min after coming from hole.	
						frx. 347.4 ≈ 35° to horizontal,	
						348.2 horiz., 348.5, horiz,	
						348.65 Horiz. 349.85	
						Note: Core loss, 1 ft. possibly	
						from bottom of range: 350.1	
						-351.5	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74 068

DATE 10-23 TITLE

START COMPLETE

EQUIPMENT USED

BORING NO. P-4- Core

ELEVATION DATUM

WATER LEVEL AFTER

LOGGED BY Cravor

P-39

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
			351.55-371.55				
						$\frac{9.93+9.42}{20} = \frac{19.35}{20}$ Recovery	
						RQD ≃ 50%	
			Parting Planes				
			352.4			354.3 357.35 360.78	368.95
			352.6			354.45 357.5 361.45	369.23
			352.65			355.03 357.72 361.9	369.8
			352.7			355.45 357.86 361.93	370
			352.8			355.53 357.95 362.45	370.1
			352.9			355.75 358.1 362.5	370.31
			352.98			356 358.35 362.8	370.8
			353.05			356.05 358.37 363	371.15
			353.2			356.15 358.44 363.35	371.5
			353.35			356.4 358.58 Cavity 364	371.55
			353.4			356.5 359 364.85	
			353.63			356.6 359.35 365.25	
			353.64			356.73 359.65 Cavity 366	
			353.78			356.93 360.07 366.5	
			353.96			357.25 360.18 367.1	
			354.04			357.3 360.57 368	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P4 cont
DATE 10/23 TITLE Sun Phillips
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED Gardner Denver
LOGGED BY B. Siems

P-40

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
351.55-371.55						Siltstone 5YR 4/2 dark reddish	grey
						v.f. grained; calcite & clay; hard;	
						structures detailed by depth-	
						generally very thin laminations,	
						horizontal, frequent partings,	
						pyrite, hydrocarbon zones (detailed	
						below), calcite, nahcolite,	
				major		variations are in form of CO_3	concentrations
		&	attitude of			laminae:	
			351.55-	352.4		- Carbonates with pyrite are in very tiny oval	
						pods aligned with bedding (.01'-.03'	
						long); some beds (.01') are nearly	entirely
						made up of pods	
			352.4-	354.1		pods become larger & more numerous,	
						beds of carbonates & pyrite are	thicker
						(>.03'); 20-25% of total rock;	
						CAVITY AT ~353.8	
			354.1	-356		Carbonates form crystals & groups	of crystals;
						most freq size ~.04'; preferred	orientation
						is with bedding, but ~~==~~ frequently	cross

bedding also; may be seen as smaller

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P4 core
DATE 10/23 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED Gardner Denver
LOGGED BY B. Siems

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
				35 .40%	CO_3's	crystals concentrated in tubes	
						resembling worm burrows ~ v.01' diam;	
				356-358.5		Carbonates with pyrite form beds	
						of crystals from .01-.2' apart &	
						<.01'-.03' thick; zone at 357 (356.8-	
						357.3) has dikelets & burrow form	
						again; from <10% to 20% CO_3's;	
				358.5-359.6		- CO_3's rarer & form straight "dike"	
						like forms shooting of beds; also	
						occur as v. tiny pods along bedding;	
				359.6-361		Like 351.55+ section 30-50%	
				361-361.6		Like 359.6 - tiny pods - some tiny ~~beds~~ laminae	
				361.6-363.5		Siltstone - shaly -	
						bituminous material begins at ~362;	
						concentrations of Carbonate pods & needles occur but are rarer;	
						bedding to 25° with core; petroliferous	
						material is most concentrated around	
						363 & below; near 363 bed occurs	
						with CO_3 needles	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 24-068
BORING NO. P4 Core
DATE 10/23 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED Gardner Denver
LOGGED BY B. Siems

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
			363.5	-364		siltstone as before with tiny	
						CO_3 pods	
					364	Calcite & nahcolite cavity	
				364 - 364.5		-layered (.07' thick) CO_3's, one tube ~60° to	
						horiz; .3' long	
				364.5 -365.2		tiny pods & concentrations as	
						351.55	
				365.2 -367		beds, burrow shapes & cavities filled	
						with carbonates & pyrite; 20% -25% of	
						total rock; cavities .15' to width	
						of core	
				367 -368.5		-siltstone with tiny pods as 364.5-	
						but smaller than 351.55	
				368.5-		beds & dike forms, longest dike .8'	
				368.5-369.8		- as 367 0-20% CO_3's	
				369.8 -370.4		- ~~beds~~ small laminae & larger irregular	
						patches to .1'; ~20% CO_3's	
				370.4 - 371.55		-pods - tiny - as 367	

NOTES:

FUGRO

7-23-73

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. D4 Core
DATE 10/23 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED Gardner-Denver
LOGGED BY B. Siems

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
			371.55 - 391.55			9.55+9.15 = 18.7/20	Rec
						RQD = 17/19.7	
			PARTING PLANES				
			371.6			375.73 379.9 383.5	
			372.85			376.3 380.45 384.1	
			373.4			377.4 380.7 385.25	
			373.65			377.5 ~381.4 385.8	
			373.85			378.2 ~382.15 Put	
			374.15			378.45 ~382.6 missing core	
			375.3			378.7 ~383.1 here	
371.55-373.5						Siltstone same as above; red brown, slightly	
						calcareous; f.grained, tiny pods of calcite	
						2 NAHCOLITE CAVITIES - between 372.5'&	
						373.4	
						Thin bitumen lenses with laminae-	
						discontinuous; frequency - ~.2' - laminae	
						with bitumens occurs	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068 BORING NO. D4 core

DATE 10/23/74 TITLE ______ ELEVATION ______ DATUM ______

START ______ COMPLETE ______ WATER LEVEL ______ AFTER ______

EQUIPMENT USED Layne Western LOGGED BY B. Siems

Gardner Denver

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
373.4 – ~~375.2~~						Siltstone - same as above without	
380.5						the tiny carbonate pods; slightly-	
						moderately calcareous; hard; v. thinly	
						& evenly laminated; bitumen lenses as above	
				375.3-.5		Two thin calcite beds .03' & <<.01';	
				377.4-		thin carbonate bed (.01') with minor magnetite	
				~~377.4~~, 3		78.45-379, NAHCOLITE CAVITIES	
380.3 - 384						Siltstone similar to above, has tiny	
						carbonate pods; similar to 370.4 zone;	
missing core was probably in this interval				382.6			
384-385						Siltstone 5YR 3/1, dark grey; fine-grained,	
						mod. calcareous - calcite & clay cement;	
						hard; v. finely & evenly laminated;	
						bituminous - not highly;	
385-391.55						Siltstone - same as before - 373.4-380.5	
						NAHCOLITE & Calcite 385.25	

389.85-.9 - med. grey Sandstone; v.f. grained, soft; undulating contacts - sharp; well sorted, non laminated; pods of this rare in mat'l above; ~.01-.02';

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10-24 TITLE
START COMPLETE
EQUIPMENT USED

BORING NO. P4 core
ELEVATION DATUM
WATER LEVEL AFTER
LOGGED BY Cranor
P-45'

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
391.5 –		RQD = $\frac{31}{226.2}$			$\frac{18.85}{20.00}$	Siltstone, weak red - reddish gray,	
411.5				= 0.137		dark reddish gray, fine to	
						very fine, well sorted. $CaCO_3$ cement,	
						hard, moderate to strong calcareous,	
						Thinly laminated, Small lenses,	< .2"
						thick, of FeS_2 between 394.5'	*
						and 400.5'. Through out the	
						run are small elongate spots <.1"	
						thick & .1-1.0" long of hydrocarbon.	
						@ 406.3' a small calcite lined	
						cavity, 405.4' a 1." band of	
						siltstone with about 10-15%	
						FeS_2 spheres, ≤ .1" across. 408.0 –	
						≃ 408.4' core is crumbled and broken.	
						409.8' tan porous zone, mod calcareous,	
						410.2, Nocolite cavity	
						399.5-399.7', DK gray to black	
						porous zone, cavities filled in part,	
						with calcite,	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-4 core
DATE 10-24 TITLE
ELEVATION 5640 DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED Layne Western
LOGGED BY Craver
(Cont.)
P-4b

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
391.5 -						frx, 395.95, 398.9, 399.2, 399.5,	
411.5						399.7, 400.6, 404.45, 404.9, (405.7)	50° inclin
				30° inclin		(406.7), 406.6, 406.9, 407.1, 407.4,	
						407.65, 407.8, 408.0, 408.4,	
						409.8, 410.3, 410.85'	
~~411.5 -~~						0.75' ~~of~~ Core missing, probably	
						from 408.0' area, surface is	
						irregular,	
411.5 -		RQD = 100			19.75 / 20.00	Siltstone, very dusky red,	
412.5						very fine grain, well sorted,	
						hard, non calcareous,	
						Thinly laminated, surface	
						of core is much smoother	
						than whay has been seen	
						before. ~~[illegible]~~ 412.5' end	
						is ~~pitted~~ coated with Calcite	
						and may be place of some	
						core loss. (0.25').	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE ________ TITLE ________
START ________ COMPLETE ________
EQUIPMENT USED ________

BORING NO. P-4 core
ELEVATION ________ DATUM ________
WATER LEVEL ________ AFTER ________
LOGGED BY Cramer

P-97

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
412,5-						Siltstone, Varies in color	
431,5						dark reddish gray to. 421,35'	
						becoming a reddish brown to	
						423,5' when it is a dark gray.	
						becoming reddish brown again	
						@ about 426', and remains so	
						to 431,5',	
						Grains are fine to very fine	
						except at the following locations	
						where small, (< 2 mm) pits	
						or $CaCO_3$ XL, occur. these	
						zones are 0.1' to 0.05' thick,	
						413,6, 413,85, 414.3	
						414.8, 415,4.	
						Moderate to Slight Calcareous,	Small
						Lenses and thin horizontal	
						of hydro carbons are through	
						out the the core.	
						finely desiminated FeS_2 grains	
						also present.	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P4 core
DATE 10-24 TITLE
ELEVATION
DATUM
START
COMPLETE
WATER LEVEL
AFTER
EQUIPMENT USED
LOGGED BY Crawn

P-48

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
412.5 -						upper part of core contain	
431.5'						several frx and parting plains.	
cont.						@ 412.8 & 412.8 horiz frx	
						and 412.8' frx inclined 60°	
						to horz. parting plain at.	
						413.65', 416.85', 417.5, 418.2'	
						horiz frx. ~~[illegible]~~ at 421.3, 422.3	
						423.85'; @ 423.85' a vertical	
						splinter 0.8' long occurs. 424.15	
						427.8, 430.6.	
						@ 421.3 - 421.4, dk gray	
						fine grained Ss bed.	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-4 core
DATE 10-24 TITLE
ELEVATION 5640 DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED Gardner Denver
LOGGED BY B. Siems

P-49

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
451.5		RQD=100			20,20 20.0	Problem with depth labels; measured stickup & next core should then begin at 450.4; Labeled current core from bottom using those depths - ∴ 430.23-450.4	
430.23-450.4						Siltstone- shaly 5YR 4/2-slightly greyer; dark reddish grey; v fine grained; calcite & clay cement; v. thinly laminated-even bedding-undeformed except rare small sandstone beds to be noted later; horiz. to ≤40° to horiz mica-v. minor; hydrocarbon flecks & partial laminae locally - zones to be noted later;	

Parting Planes

432.38	439.7	448.83
433.55	440.72	449.36
434.95	441.45	450.3
436.74	442.7	450.4
437.8	445.75	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P4 core
DATE 10/23/74 TITLE Sun Phillips
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED Layne Western - Gardner Denver
LOGGED BY B. Siems

Page 50

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	

431.8 to 434.2 - ~~laminae with~~ discontinuous partial bituminous laminae in specific beds - ie. 3-4 partial laminae / bed, then none until next concentration; concentrations v. .03' - .4' separation, most frequent is .1'; become more widely spaced lower in core;

432.2 - 432.4 contains two thin ~~carbonate~~ clayey beds with carbonate concentrations; v. small Xls - probably some nahcolite;

432.55 - deformed .03' thick grey SS bed; "cauliflower" like shape to contacts

top to 435.3 is slightly darker - contains more very thin petroliferous laminae than core below; laminae are very fine, grade in both directions into nonpetroliferous material;

437.8 - 438.8 - contains many tiny (<<.01') oval pods of carbonates, concentrated along bedding & in certain zones;

~438.6 - 440.2 - slighter ~~b~~ bitumen content;

439.1 - ~446.8 pick up discontinuous bitumen laminae - as 431.9 - 434.2;

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P4 core
DATE 10/23/76 TITLE Sun Phillips
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED Layne Western – Gardner Denver
LOGGED BY B. Siems

51

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
					439.9	- med dk "grey" discontinuous sandstone "augens" - ~.01' thick	
					442.45	- grey undulating, non calcareous, carbon~~ates~~aceous ~.02' thick; SS bed;	
						carbonaceous spots on sltst. ~~bed~~ parting	
					444.05	- discontinuous, ~~def~~ augen shaped	
					448.24-.31	grey sandstone	
					449.7	"	
					446-448	scattered partial laminae of SS - .1-.2' separation;	
$4\overset{7}{5}0.4$ - $4\overset{7}{5}0.5$					Rec	= 100% 20.3/20.1 RQD = 100	
						Shaly siltstone - reddish grey, v.f. grained, calcite, very hard, v. finely laminated - undeformed, contains sandstone ~~bd~~beds as detailed below; petroliferous in zones as detailed below	
Fract			451.5-.8			contains tiny CO_3 blebs; (<<.01')	
Partings: 450.4, 455, 458.15, 462.6, 467.9, 44			451.9			- tiny med. dk grey carbonaceous SS pinching bed <<.01' thick;	
			452.6 - 453.5			- contains a number of laminae richer in hydrocarbons	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P4 core
DATE 10/24/74 TITLE Sun Phillips
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED Layne Western Gardner Denver
LOGGED BY B. Siems

52

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						454.2 - 456.95 - thin discontinuous bituminous laminae as in previous core; ~same spacing - .05'-.5', most freq. ~.1'; <<.01' thick;	
						456.5 - 456.95 - thin (~.01' or less) laminae of claystone ~~Siltstone or - clayey~~; 7.5YR 8/2 - 9/2; hard - softer than shaly siltstone; well sorted; slightly calcareous; rare hydrocarbon flecks; interbedded with siltstone;	
						459.2 - 459.6 - more petroliferous zone - thin dark laminae interbedded with other shaly siltstone	
			7			459.6 - 462.6 - nothing different than whole core descr.	
						462.6 - 462.9 - ~slightly richer in ~~ca~~ carbonaceous mat'l;	
						464.6 - ~.03' thick layer of dark reddish black sandstone - probably petroliferous; hard.	
					also	sim at 466.1, 466.6, 466.9	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068 BORING NO. P4
DATE 10/26/74 TITLE Sun Phillips ELEVATION ____ DATUM ____
START ____ COMPLETE ____ WATER LEVEL ____ AFTER ____
EQUIPMENT USED [illegible] Drawn Layne Western LOGGED BY B. [illegible]

53

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
470.74 to 487.14						from strapped rods	
						Rec - 16.89/17 RQD = 100	
						Partings: 478.17; 482.8	
				Siltstone		: Y5R 4/2 dark reddish grey;	
						v. fine grained; calcite frequently,	
						& clay; v. hard; slightly calcareous	
						to mod. calcareous, some very; v.	
						thinly laminated (<<.01'), even undeformed;	
						variations will be noted below:	
						470.95 = .03' diam blebs of grey SS; 470.85 - 471.25 - tiny blebs of carbonate as	
						before (oval, aligned w. bedding, (<<.01');	
						471.8 - begin getting v. thin petroliferous	
						laminae - one at 471.8 - <.01'; more after	
						~472, increasing in frequency to 425.05;	
						425.05 - v.1' thick petroliferous dark	
						grey bed, non calcareous; hydrocarbon	
						cement?;	
						472.25 - med dk grey SS - irregular	contacts
						& pinching bed; carbonaceous	or other dk min;
						473.7 & 474.25 - deformed, irreg. SS	as 472.25

474.9 - red brown flakes - thin bed, non

NOTES: calcareous, assoc. with carboniferous mat'l;

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10/24 TITLE Sun Phillips
START ______ COMPLETE ______
EQUIPMENT USED Layne Western
Gardner Denver

BORING NO. P4
ELEVATION ______ DATUM ______
WATER LEVEL ______ AFTER ______
LOGGED BY B. Sims
54

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						475.15-476.6-non petroliferous reddish	
						grey siltstone;	
						476.6 again begin picking up fine petroliferous	
						laminae; very minor - make no dark	
						grey beds, only occasional laminae;	
						to 478.6;	
						478.6- discontinuous .01' bitumenous ~~Lat~~ laminae,	
						to 482.5 -siltstone as above with minor amount of bituminous	
						laminae,	
						482.5-482.7- tuffaceous Sandstone, 7.5YR7/,	
						micaceous; clayey & silty; v. fine grained,	
						calcite cement;	
						482.7 to 487.14- siltstone-decreasing	
						petroliferous material to ~484, almost	
						nonexistant below 484;	
						485.5 med dk grey sandstone - pods-	
						~.03' diam;	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-4 core

DATE 10-25 TITLE

ELEVATION DATUM

START COMPLETE

WATER LEVEL AFTER

EQUIPMENT USED Layne western Gardner Denver 2000

LOGGED BY J Cranor

P-55

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
487.15 –		RQD =100			20.00 20.00	Siltstone, dark reddish gray 5YR	4/2,
507.16						v.f. grains, well sorted, CaCO3	
						cement, hard – very hard,	
						strong reaction to HCl. Thinly	
						laminated < 0.1". @ 493.2' a	
						0.5" thick, med grained Ss bed	
						Ss also at 494.1' + 494.2' < .5"	
						thick both. 497.1 + 497.3'	
						Ss occurrences, < 0.2" thick,	
						487.2 - 488.2' siltstone is	
						black with higher % of	
						hydrocarbons being present.	
						499.1 irregular shaped bed,	
						<.01' thick, of fine grain	
						Ss. dk gray to black.	
						506.06', Ss bed, 1" thick,	
						dk grayish brown, medium grained,	
						Horiz. frx. are at: 489.2, 491., 491.7,	
						493.25, 495.45, 498.6, 501.65	
						505.2, 506.1	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068

DATE 10-25 TITLE

START COMPLETE

EQUIPMENT USED Layne Western
Gardner Denver,

BORING NO. P-4

ELEVATION 5440 DATUM MSL

WATER LEVEL AFTER

LOGGED BY Cranor

P 56

527.15

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
507.16' —		RQD=100			$\frac{20.28}{20.00}$	Siltstone, reddish black 10R 2.5/1 -	
527.15'						dark reddish gray 10R 3/1, Very fine	
						grained, well sorted with several	
						small, 1." to .1" thick, Sandy	
						beds and lenses, Some containing	
						hydrocarbons, from *514.8' to	
						527.15, Very hard, Cementation	
						Calcite possably some SiO_2,	
						moderate reaction to HCl,	
						siltstone thinly Laminated,	
						sandstone deposits are laminated.	
						Fractures. (Mecanical Brakes),	
						507.56, 509.17, 510.13 (arcuate)	
						511.83, 512.94, 513.56, 515.50,	
						514.25, 517.56, 518.25, 518.73	
						519.43, 521.95, 522.44, 523.05,	
						523.59, 524.55', 526.70,	
						Note: All of core cut was recovered	
						including that at the surface of the bit.	

NOTES: Sandstone bed @523.1 contains fair amount Fe_3O_4

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P4
DATE 10/25 TITLE Sun Phillips
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED Layne Western – Gardner Denver
LOGGED BY B. Siem

57

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
527.15 –	547.15					Depths defined from tool string & kelly	
Rec	20/20	RQD = 100				down – 547.15' tools in hole, kelly all	
P. Planes	541.74		536-1, 543.68			way down @ end of run)	
527.15 – 538.8	Siltstone					– 5YR 3/1 – 4/1 very dark grey (with brownish caste)	
						some sand size material; poorly sorted; slightly to	
						moderately calcareous, v. thinly laminated ~~to~~ –	
						very even beds; slight undulating @ times; v. micaceous – fine sand size to	
						.005"; – 1% or less of rock; clay flecks (long pod-like flat bits aligning w/ bedding); moderately petroliferous –	
						Details noted below;	
				527.15 – 529		less petroliferous – slightly, few black	
						laminae; clay flecks ~1% to 528.1 – much less below;	
						sandstone laminae – <<.01' thick – to 528 very mixed	
						with sltst, but minor amt; ~~bed~~ lamination @ 528.5;	
				529 – 52~~9~~9.8		– higher grade oil rock – mod. petroliferous;	
				529.8 – 537.1		– even grade – but less than 529;	
						still mod. petroliferous;	
				Sandstone		pods & laminae – at 530.5, 531.5, 537.7 (pod – ; others also exist	
						~.05' by .2'), 532, 532.2, 532.7, 533.7, .85, 535.5, 534.6, .7, .8	[illegible], 536.5, 537.8
				533.2 – 537.05		increase in sand content (still minor) & clay	
						flecks; ~~to~~	

Joints –
suggestion in ~541.65
mech. fract. ~45° ∠s – both ways; 1 separation)
11 – D3 1 sep. 7 the other;
5 one way, 2 planes each .03 – .05' separation
also 546.55 – 60° way

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P4
DATE 10/25 TITLE Cue Phillips
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED Gardner Denver)
Layne Western
LOGGED BY B. Geins

58

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	

5 Sandstone laminae - 537.~~[illegible]~~, .75, .8, .85
538.3; ~~[illegible]~~
537.8 - 538.3 - higher grade, clay flecks
538.3 - 547.15 - Siltstone - dark grey, less red caste; sandy &
sand laminae; poor sorting; med - highly
calcareous; v. thin laminae, even layered, sandstone
in discontinuous laminae; as well as v. thin
continuous ones; v. sl. petroliferous to med.
high content of bituminous mat'l; tiny clay pods - (c.01
scattered & rounded; micaceous;
~~Sand less & concentrated in laminae below 541.~~
542.2 - 542.9 richer in petroliferous mat'l →
moderately high grade; clay pods; 1' SS at 542.5
542.9 - 547.15 as before; significant but minor
amt of sand - variously included in the
shale or concentrated in laminae;

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10/25 TITLE Sun Phillips
START ______ COMPLETE ______
EQUIPMENT USED Gardner Denver
Layne Western

BORING NO. P 4
ELEVATION ______ DATUM ______
WATER LEVEL ______ AFTER ______
LOGGED BY B. Siems
P. 59

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
547.15 - 567.1						Rec. = 19.83/19.95 RQD = ~~19.85~~/~~19.85~~	~~19.73~~ 19.83
	from stripped tools		Siltstone			Shaly 5-YR 4/1 dark grey w. reddish	
						caste; fine grained; calcite & hydrocarbons &	
partings:						clay?; hard; mod. calcareous; v. thinly	
549.5						laminated-undeformed; slightly micaceous-	
551.1						less than above; slightly petroliferous; ~~[illegible]~~	
559.1						~~[illegible]~~; rare coarser laminae containing	
56						~~c~~red brown vitreous flakey material-	
						~~&~~ also rare grey SS beds-non calcareous;	
						547.54 & 548.5 - mixed black & red brown	
						~~bed~~ of sandsize mat'l	
						550.95-grey sand size pods; black rim	
						(magnetite);	
						551-555.2- Siltstone as described relatively ~~[illegible]~~	
						uniform, decreasing from sl. petroliferous	
						to almost non petroliferous;	
						555.2-555.95- much higher grade ~~greater amount~~	
						~~of oi~~ of oil shale - mod. high;	
						decreasing grade to 556.5 - still	
						mod; then below - v. slight;	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P4
DATE 10/25 TITLE Sun Phillips
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED Gardner Denver - Layne Western
LOGGED BY B. Siem
60

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	

556.5 - 560.7 siltstone as described above - relatively uniform, only v. slightly petroliferous

560.7 - 561.3 - mod. highly petroliferous;

561.3 - 562 decreasing hydrocarbon content - mod low

562 - 563.2 - v. slight hydrocarbon content

563.2 - 566 - slight - mod hydrocarbon content;

563.2 - magnetite ss lamination - ~.02'

567.10 - 587.05 - from strapped rod measurements;

Recovery: $\frac{9.78 + 10.46}{19.95} = \frac{20.24}{19.95}$

RQD: 100

Siltstone, ~~[illegible]~~ color dark reddish gray, 569' aproching black due to hydrocarbon content.

575.2' to 576' more hydrocarbon causing darker color. Very fine, well sorted, few small Ss beds, black well rounded, hard with some mica flakes,

NOTES:

FIELD LOG OF BORING

PROJECT NO. 74-068

DATE 10-26 TITLE

START COMPLETE

EQUIPMENT USED Layne Western
Gardner Denver

BORING NO. P-4 Core

ELEVATION DATUM

WATER LEVEL AFTER

LOGGED BY J. Cranor

P - 61

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
567.10–					~~[illegible]~~	Siltstone thinly Laminated,	
587.05						CaCO$_3$ + SiO$_2$(?) Cement, hard,	
						moderate reaction to HCl,	
						Horiz. frx. 568.75, 570.75,	
						573.85, 576.25, (horiz and Vertical	
						length ?? few inch), 577.20, 583.7,	
						584.05, 585.20, 585.35 (	
						both Horiz and Vertical, few inches	
						long).	
587.05–		RQD=100.			20.02 20.00	Siltstone Same physical	
607.00'						properties as above.	
						Several Ss beds between	
						0.04' and 0.3' thick occure in	
						this run, all contain hydrocarbons,	
						one at 502.8' is tacky to the	
						tuch, black in color and look to	
						contain free oil, the others	
						are only dark brown to black	
						and not tacky. Grain Size is medium	

and rounded.

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10-24 TITLE
START COMPLETE
EQUIPMENT USED Layne Western
Gardner Denver, 200

BORING NO. P-4
ELEVATION 5640 DATUM
WATER LEVEL AFTER
LOGGED BY Cranor

P-62

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
587.05'-						frx all horiz – 590.8', 593.4'	
607.00						514.84, 605.05', 606.5, 599.15	
						Parting plains 597.7, 599.5, 602.8	
						Parting Plains all occure in a Ss	
						unit or at the contact of Ss and	
						siltstone	
607.00-		RQD=100			19.85 19.93	Siltstone, brown to dark brown,	
626. .85						general lithology + discription	
						same as above. Sandstone beds, laminations	
						and lenses are from <1/10" to	
						6" thick with a large % being nearer	
						the smaller limit. Surfaces vary	
						from smooth to undulating, Colors	
						from red brown to light gray	
						to black, depending on amount	
						of hydrocarbons present. A 608.2'	
						is a 0.5' Ss bed with much	
						oil is tacky to the tuch.	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10-26 TITLE
START COMPLETE
EQUIPMENT USED Layne Western
Gardner Denver.

BORING NO. P-4 core
ELEVATION 5640 DATUM
WATER LEVEL AFTER
LOGGED BY J. Cranon

P-63

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
607.00 -						fractures; 608.85' 610.25'	
626.85						612.83', 621.03'	
						Parting plains - 611.42' (uneven	
						surface), 614.48', 616.05', 617.81',	
						625.57'	
						Mecanical brake 624.10'	
						Parting Plains occure in ~~or~~ Sandstone	
						beds or along the contact between	
						Sandstone and shale.	
						Note: difference in core length	
						and amount cut is due to core	
						braking off in hole at bottom	
						of run.	
					*	617.35' to 617.5' 5 small	
						vertical frx. were noted	
						Surfaces slightly erregular,	
						un coated, all parallel,	
						in Ss bed.	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P 4 core
DATE 12/26/74 TITLE Sun Phillips/SoHio
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED Layne Western-Gardner Denver
LOGGED BY B. Siems
P 60

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
626.93-646.93						Shale- 7.5 YR5/2-4/2 slightly	
'						blacker than brown-dark brown;	
						v.f. grained; slightly silty; hard to	
Partings:						v. hard; v. thinly laminated, even,	
631.85						undeformed beds; mod calcareous to	
634.28						v. calcareous; sl- mod. petroliferous;	
635.8							
						626.91-631.85 mod calcareous	
						631.85-642.8 v. calcareous	
FRACT						Richer ~~Beds~~ zones at: 629.3-629.7	
634.95						634.3-634.8	
636.5						639.3-639.35	
636.8						640.5-640.7	
637.45						642.6-643.2	
						Tuffaceous Sandstone (.05') at 634.25 634.05-.01'	
						red brown, bleeding tar; 643, .05, .2, .6, .7, 623.3, .5, 629.6, .85	
						→ thin laminae (<.01') of sim. at ~~[illegible]~~, 644.5, 646.?, .8	
						640.5-not bleeding; med dk grey,	
						magnetitic;	

How?

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. Q4
DATE 10/26 TITLE Sun Phillips/SOHIO
ELEVATION _____ DATUM _____
START _____ COMPLETE _____
WATER LEVEL _____ AFTER _____
EQUIPMENT USED Layne Western-Gardner Denver
LOGGED BY B. Siems
Q-61

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	

* Wavy bed (pred. 70' above Mah. Marker)

634.8-637.7

Tuffaceous Sandstone

634.8-636.1- 7.5YR 7/1-7/2

Sandstone with shale, w/30-50° light grey (SS) to pinkish (sh.) grey, v.f. grained, well sorted, v. hard, SS-non calcareous, shale-v. calcareous; thinly laminated sltst. with thinly bedded SS-bedding very wavy & distorted - contacts of SS-Shale gen. abrupt, but each may include bits of the other; SS+ v. micaceous-biotite; bleeds v. minor amt of tar;

636.1-637.7 Sandstone - Similar to above, shale is very minor; still distorted & micaceous; poorly sorted - calcareous shaly material is mixed with sand; non laminated metallic min. - pyrite? & more grey colored one; bleeding tar - entire thickness;

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10/26 TITLE Sun Phillips
START ______ COMPLETE ______
EQUIPMENT USED Failing (Western) — Gardner Denver

BORING NO. P4
ELEVATION ______ DATUM ______
WATER LEVEL ______ AFTER ______
LOGGED BY B. Siems

P-62

666.89
19.95

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
646.93-666.89						Rec 8.74+11.14 19.93/19.96	
						RQD = 100	
				Shale		5YR 4/2-3/1-3/2; v. fine gr;	
						v. hard, sl. to mod. highly calcareous,	
						w/ hydrocarbon cement v. thin laminated, undeformed,	
						sl. micaceous, sl. silty; sl-mod ~~highly~~	
						petroliferous; rare SS laminae as descr.	below
				to 648 -		sl. petroliferous	
				648-653		- v. sl. to non petroliferous	
				653-656.5		- sl. petroliferous with mod to	
						high ~~beds~~ laminae (.01') at 654.8, 655.3, & other	
						v. thin laminae;	
				656.5-659.3		- sl petroliferous	
				659.3-660.1		mod. petroliferous	
				660.1-662.2		- sl. petroliferous with higher	
						beds (not high) at 660.4, .5, 661.6.	
				662.2-665.5		- sl. petrolif. but higher than	
						above; bands more frequent (to .01'	
						separation)	
				665.5-666.5		- moderately highly petrolif;	

666.5 to 666.9 - sl.

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10/76 TITLE Sea Phillips
START ____ COMPLETE ____
EQUIPMENT USED Layne Western / Gardner Denver

BORING NO. P4
ELEVATION ____ DATUM ____
WATER LEVEL ____ AFTER ____
LOGGED BY CJEMS

P-63

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
				SS		laminae - irreg, pinching, grey	
						<1/Ft	
				663.5-		SS - v. light (nearly white) clean	
						f.gr. SS lenses ≈.01-.02' thick;	
						irregular;	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10-27 TITLE
START COMPLETE
EQUIPMENT USED Layne Western
Gardner Denver 2000

BORING NO. P4 Core
ELEVATION DATUM
WATER LEVEL AFTER
LOGGED BY John Cranor

P-64

657.08

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
666.89 –		RQD =100			20.25 20.00	Siltstone, brown to dark brown	
~~[illegible]~~						well sorted, very fin grained,	
669.40						Reaction to HCl is strong but	
						where hydro carbons are	
						abundant (dark brown) no	
						reaction. hard to very hard,	
						thinly laminated, varved,	
						~~ss~~ moderately fissel.	
669.40 —						Siltstone, brown to reddish brown,	
669.73						well sorted, very fine, strong	
						reaction to HCl, very hard,	
						thinly laminated, moderately	
						fissel,	
669.73 —						Siltstone; Lt. reddish brown	
676.05'						to Lt. gray 5YR, fine grained,	
						well sorted, moderate reaction	
						to HCl. very hard, Thinly	
						laminated to very thinly bedded.	

NOTES: Added 19.98'

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10-27 TITLE
START COMPLETE
EQUIPMENT USED

BORING NO. P-4
ELEVATION DATUM
WATER LEVEL AFTER
LOGGED BY Craner, J.
P-65

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
669.73 –						673.80 Fracture, horiz, undulating	
676.05						surface coated with a white	
						deposit looks to be mixture of	
						$CaCO_3$ and Clay.	
						Sharp contact with under-	
						lying unit.	
676.05						Siltstone weak red, very	
~~[illegible]~~						fine grained, no reaction to	
686.57						HCl, Very hard. Thinly	
						laminated ~~to thinly bedded~~ to laminated,	
						thicker of the ~~[illegible]~~ laminations	
						between 683' and 686	
						are a reddish brown fine	
						grained Sandstone with	
						some small amount of moisture	
						contained - Same intreval shows	
						same siltstone containing little	
						hydrocarbons.	
						@ 675.8 Small vug ~ 1" in diat.	

lined with white, noneversent mineral;

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-048

DATE 10-27 TITLE

START COMPLETE

EQUIPMENT USED

BORING NO. P-4 Core

ELEVATION DATUM

WATER LEVEL AFTER

LOGGED BY Cranor

P-66

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
684,87 -		RQD=100			19,93 / 20,01	Inter bedded siltstone and	
690,15						Sandstone, pinkish gray -	
						dark reddish gray 5YR (siltstone)	
						Ss reddish brown 5YR,	
						Siltstone fine to very fine,	
						Ss medium to fine, each is	
						well sorted, Ss is hard,	
						siltstone very hard.	
						Cementation $CaCO_3$ and/or SiO_2?	
						slight to no reaction with HCl.	
						Thinly laminated with very thin	
						beds of Ss which are uneven,	
						nodular and have undulating	
						surfaces. Some show ripple	
						marks. below 658,30'	
						Ss contains hydrocarbons	
						and are black in color.	
						above 658,30 Ss without	
						hydrocarbons bleed water and	
						outgase. Ss beds 0,2" to 2,6" thick	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-4 Core
DATE 10-27 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED Layne Western
Gardner Denver 2000,
LOGGED BY Craven
P-67

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
690.13 –						Siltstone with a few very thin	
695.15						beds of Ss having less hydrocarbons	
						than above. Same general	
						physical properties as above.	
695.15 –						Siltstone, pinkish gray to	
702.60						dark brown, fine to very fine	slight to No reaction to HCl.
						grained, well sorted, very hard,	
						thinly laminated.	
						occasional ~~[illegible]~~ lamination	
						of Ss,	
702.60						M M ~~Zone~~, Sandstone,	
703.05						two beds, top, medium to	
						coarse 1.4" thick top surface	
						has slight undulation, Slight	
						indication of bedding in upper	
						portion, Contact between	
						upper and lower portions is	
						sharp & well defined.	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-4 Core
DATE 10-27 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED Layne Western Gardner Denver.
LOGGED BY Craner, J.

P-68

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
702.60						MM Zone (Cont.) lower portion	
703,05						~~is fine grained + black~~	
						is finer grained and blacker	
						than upper. Contains small, <0.5",	
						irregular shaped patches	
						of dark gray Ss present in	
						lower unit, interformational	
						breccia? Bottom portion is	
						a little harder than the top,	
						and lower contact	
						with the silt stone	
						is a little more uneven	
						than the top but not to	
						an extream.	
703.05-						Siltstone, dark brownish gray	
706,88						to Lt. grayish brown. 10YR.	
						Simular to that above the	
						MM	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-048
BORING NO. P-4 Core
DATE 10-27 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED Layne western
Gardner Denver 2000
LOGGED BY J. Cranor
P-69

5.11

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
684.87–						Parting plains: 687.8, 689.3,	
706.88						691.4 (uneven surface), 692.55,	
						694.00, 694.5, 698.2, 701.8,	
						702.7 (in MM stain Stept)	
						704.3	
706.88'		RQD: 100.			10.00'	Silty Shale and siltstone,	
716.41						brown, 7.5YR 4/4, to very	
						pale brown 10YR 7/4, Moderately	
						hard, very fine grained,	
						moderate to strong reaction	
						with HCl. Thinly laminated.	
						few irregular shaped thin Ss lenses	
						and pods < ½" thick, moderately ~~friable~~	fissel,
716.41'						M Zone, Oil Shale,	
						black low density, very fine	
						grained, hard, no reaction	
						to HCl, ~~Friabl~~ at top three	
						Parallel vertical frx,	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068 BORING NO. P-4

DATE 10-27 TITLE ELEVATION DATUM

START COMPLETE WATER LEVEL AFTER

EQUIPMENT USED LOGGED BY B. Siems

5,A

P-70

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
716.41 - ~~71~~9.			719.65			surface is quite smooth,	
						Roundness due to core barrel	
						blocking off with sand,	
716.94 -		737.02			Recovery 19.73/20.08 RQD = 19.73/19.73		
ly core			Mahogany		Marker – 716.41–719.65		
					as above; v thinly laminated, black to dark		
					reddish brown; hydrocarbon cement;		
					looks coarse grained – in places due to hydrocarbon		
					crystals?; waxy feel in places; core return waxy;		
~~719.65~~				~716.9 – hydrocarbon bed containing green (5Y 4/2 –			
				5Y 3/1 – but green is less olive, more true			
					green;		
			719.65 - 720.2			shale 5YR 3/2 dark reddish brown;	
						Calcite & hydrocarbon; v. hard; v. calcareous;	
						v. thinly laminated – undeformed; mod.	
						highly petroliferous again;	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P4 core
DATE 10/27/74 TITLE Sun Phillips / SOHIO
ELEVATION ________ DATUM ________
START ________ COMPLETE ________
WATER LEVEL ________ AFTER ________
EQUIPMENT USED Layne (Western) - Gardner Denver
LOGGED BY B. Siem

(5.A)

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	

720.2 - 720.3 - as Mahogany Marker - oil shale black, shiny, waxy, low density, conchoidal fracture, natural parting planes with horiz bedding more frequent (720.2, 720.3;

720.2 - 721.8 v. high grade oil zone

720.3 - 720.4 v. high grade, lower than 720.2 - 720.3; contains green min. sim. to 716.9; v. thinly laminated, undeformed;

720.4 - 721.8 - oil shale 5YR 2.5/2 dark reddish brown; v. fine grained; v. hard, non calcareous, v. thinly laminated; feels waxy when scratched - tends to "cut" rather than form powder;

721.8 - 721.9 - sandstone - tuffaceous? - dark red brown to white, hard to v. hard, non calcareous, highly deformed contorted bedding, laminae pinch; quartz, v. rich in hydrocarbons - black & red brown;

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10/27 TITLE Sun Phillips/SOHIO
START ______ COMPLETE ______
EQUIPMENT USED Layne-Western) Gardner Denver)
BORING NO. P4 core
ELEVATION ______ DATUM ______
WATER LEVEL ______ AFTER ______
LOGGED BY B. Siems

P. 73

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
			730.5-730.6			Sandstone tuffaceous?; dark grey; v. f. grained, non calcareous, v. hard, uneven contacts, SS included within shale below,	
			730.6-731.25			- shale - mod. petroliferous	
			731.25-732.1			- Oil Shale - mod. to highly petroliferous, irregular grey sandstone lamination at 731.3	
			732.1-734.1			- shale - 5YR 6/2-5YR4/1 pinkish grey to dark grey; ~~c~~ carbonate/hydrocarbon cement; v. finely laminated, undeformed, discontinuous laminae; mod. to slightly petroliferous,	
			732.2-733			thin grey SS stringers every .1';	
			734.1-734.2			- slightly more petroliferous than above	
			734.2-734.35			- Sandstone dark grey, ~~sligh~~ v. f. grained, mod. to highly petroliferous, contorted bedding, shale stringers included;	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P4 core

DATE 10/27 TITLE Sun Phillips, ISOH10

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED Layne Western - Gardner Denver

LOGGED BY B Siems

P. 72

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						721.9-722- oil shale as above SS (to 721.8)	
						722 - 724.2- oil shale as 719.65-720.2 -	
						dark red brown, v.hard, mod calcareous	
						(dolomitic?), v. thinly laminated - undeformed	
						laminae; mod to highly petroliferous,	
						variable within zone,	
						Rare v. thin, (<<01') SS stringers: 722.2, .25, 723.2,	
						723.7,	
						724.2 - 724.4 oil shale Sim to 720.4-721.8,	
						highly petroliferous	
						724.4-724.9- oil shale as 722-724.2, mod-highly petro.	
						724.9-725.9- oil shale sim to 720.4-721.8	
						highly petroliferous - Slightly lower	
						grade than 720.4-721.8	
						725.9-729.3- oil shale Sim. to 719.65-720.2;	
						variable in hydrocarbon content; from	
						low to high - ave. mod. petroliferous;	
						729.3-730.3 oil shale mod. highly petro-	
						liferous;	
						730.3 - 730.5 - oil shale mod petroliferous	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068

DATE 10/27 TITLE Sun Phillips / SOHIO

START ______ COMPLETE ______

EQUIPMENT USED Layne Western / Gardner Denver

BORING NO. P4 core

ELEVATION ______ DATUM ______

WATER LEVEL ______ AFTER ______

LOGGED BY B. Siems

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
			734.25–735.05			oil shale – mod. to highly petroliferous	
			735.05–736			– oil shale – slight to mod. petroliferous; SS lense at ~735.55 – irregular contacts,	
			736–737			– shale – red brown, sl. petroliferous; more calcite – effervesces readily;	
			Partings ss			716.9, 717.2, 720.2, 720.3, 720.4, 721.03, 721.15, 736.3	
738.00 744.38		RQ	D=100		19.74 / 19.97	Siltstone – brown 7.5YR 5/4, to reddish brown 5YR 5/4, very fine grained, well sorted, CaCO₃ cement, very hard, moderate reaction to HCl,	very thinly bedded
					to	laminated bedding in siltstone with small irregular shaped, discontinuous lenses and beds of ~~[illegible]~~ ss, medium to fine grained, gray 7.5YR 5/6, max thickness about 1",	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10-28 TITLE
START COMPLETE
EQUIPMENT USED Layne Western
Gardner Denver 2000

BORING NO. P-4 Coring
ELEVATION DATUM
WATER LEVEL AFTER
LOGGED BY Craner
P-75

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
744.38 –						siltstone reddish brown 5YR 5/3 to	
756.85						dusky red, 2.5YR 3/2, very fine grained,	
						well sorted, CaCO3 cement, hard to	
						very hard, mod to strong reaction	
						to HCl. Thinly laminated,	
						with very ~~little~~ few Ss laminations,	
~~756.8~~						Parting plains: 738.25', 739.17',	
						739.75', 740.85', 741.5', 742.93'	
						743.95', 746.13', 746.90, 748.3'	
						749.65', 751.9' (uneven ~~[illegible]~~ brake,	
						753.42', 753.93', 755.20'	
756.85 776.82	RQD= ~~100~~ 97				20.28 19.97	Silty shale – clayey siltstone w/	
						few interbedded and lenses of Ss beds 0.01' to	
						0.34' thick, ~~some thin interbedd~~	
						Color of shale varies from	
						Lt. brownish gray 10YR 6/2, brown	7.5YR 5/3,
						10YR 5/3, gray 5Y 6/1 Very dark gray	10YR 3/1
						Very dark grayish brown 10YR 3/2	

NOTES: Greas on Core from Core barrel.

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068

DATE 10/28 TITLE

START COMPLETE

EQUIPMENT USED Layne Western
Gardner Denver 2000.

BORING NO. P-9 Core

ELEVATION DATUM

WATER LEVEL AFTER

LOGGED BY

P-76

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
756.85 776.82						grain size (silty shale) from	
						very fine to clay size, well	
						to very well sorted, CaCO3 cement	moderatel
					hard to	very hard, moderate to strong	
						reaction to HCl, bedding is from	
						thinly laminated to very thinly	
						bedded,	
						Sandstone beds one at 764.50'	
						to 764.93 is black, porous with	
						some hydrocarbons present.	
						765.70' a 0.06' beds of Ss	
						exibits some out gasing of air	
						or gas a brown stain indicates the	
						present of oil. other, smaller,	
						Ss beds and lenses ~~vary in color~~	
						~~fr~~ show little or no	
						evidence of hydrocarbons.	
						~~parting surfaces~~ parting plains,	
						759.2, 761.1, 761.8, 764.3, 765.9,	
						766.9, 766.95, 680, 778.5, 773.5	

774.65, 775.05, 776.2.

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P4 core
DATE 10/28 TITLE Sun Phillips / SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED Layne (Western)
LOGGED BY B. Siems
Gardner Denver P-77

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
			776.82-		796.79	Rec = $\frac{19.85}{19.97}$ RQD = $\frac{17.85}{19.85}$	
			Partings			Fractures	
			777.4		789.55	777.78 779.9	
			778.6		794.58	778.09 780.15	
			781.7		795.65	778.84 780.5	
			782.31		796.6	779.2 780.8	
			783.81			779.5 781.15	
			786.86				
776.82-777.05						Same as above:	
			Shale			5YR 2.5/2 dark reddish brown; silty; poorly	
						sorted; calcite & organic cement; v. hard to hard; sl. calcareous	
						v. thinly laminated; moderately petroliferous;	
						some areas highly petroliferous	
777.05 - 777.4						Sandstone - silty & clayey,	
						med-f. grained; poorly sorted; ~~hard~~ clay & silica?; hard;	
						non calcareous; v. thinly laminated - highly distorted;	
						laminae lensing & contorted; mica; bituminous-	
						slightly; quartz	
777.4-777.5						oil shale - moderately highly petroliferous	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P4 core
DATE 10/28 TITLE Sun Phillips/SD H10
ELEVATION
DATUM
START
COMPLETE
WATER LEVEL
AFTER
EQUIPMENT USED Layne Western
Gardner Denver
LOGGED BY B. Sims
p. 78

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	

777.5-777.6 - ~~is~~ Shale, claystone & sand - mixed in contorted bed

777.6 - 777.98 - Sandstone fine grained; light brownish grey; mixed with minor claystone & shale; mod. sorted;

778 - 778.8 - oil shale - sim. to above, 2.5Y 4/2 - dark grayish brown with olive caste - with red brown & v. dark grey to black laminae; slight to very calcareous; calcite & hydrocarbon cement; hard; v. thinly laminated, rare sand lense; laminae undeformed; ~~hard~~; olive caste ~~is~~ seems caused by a olive green waxy hydrocarbon; this color was over core from 776.8 to 781.7

778.8 - 781.67 Sandstone - 10YR 6/4 - 10YR 4/1 - light yellowish brown to dark grey; some v. dark reddish brown; coarse; rounded; poorly sorted; clay & hydrocarbon cement; v. hard; non calcareous; breccia - contains claystone fragments & highly contorted bands of varying composition; contains green waxy caste; mica; gilsonite; quartz;

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-4(core)
DATE 10/28 TITLE Sun Phillips/Sohio
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED Layne Western - Gardner Denver
LOGGED BY B. Siems

(S.A.) 10/28/74

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DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	

781.67-783.75 - Siltstone-claystone & oil shale laminae - 10YR6/3 (pale brown)) - to dark grey; calcite & clay; ~~mod~~ variable calcareousness v. thinly laminated to thinly bedded; bedding offsets cut core at 25° one way & 35° opposite; sealed - by lithification? - offsets are clear; non petroliferous to mod. petroliferous - decreasing freq. of dark laminae with depth;

782.31 - v. dark grey Sandstone, v.f. grained; magnetite;

783.75 - 790.5 - Claystone with siltstone & silty shale 10YR6/3 dominantly, to 10YR6/1 & 10YR 2/1 - pale brown to grey to black, 90% shades of brown; calcite & clay cement, rarely hydrocarbons; mod. hard to hard; sl. to mod. calcareous; v. thinly laminated to thinly bedded - max. v. 3'; v789.1 - 789.3 - mod. petroliferous; other dark laminae & zones exist; 788.5-788.7 - sl. petrolif;

790.5 - 794.7 - siltstone ~~with~~ & claystone & - color change to v 50% gray & 50% light brown; ~~v. thinly~~ ~~to~~ clay cement & calcite; ~~to~~ hard to mod. hard; v. thinly laminated to thinly bedded (to .7')

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-4 CORE

DATE 10/28 TITLE SUN / PHILLIPS / SOHIO

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED LAYNE WESTERN - GARDNER-DENVER

LOGGED BY BARBARA SIEMS

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DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
794.05 -.02' -.03'						of sandstone - med grey, v.f.	
						grained, offset & bottom contact has	
						feather intrusions into material below	
						along tiny offsets ~~[illegible]~~;	
						- ∠.01';	
794.7 - 795.63						oil shale - 10YR3/2 v. dk greyish	
						brown; hydrocarbon & clay cement;	
						also carbonate; v. thinly laminated to	
						to thinly bedded (.2' max.) contacts	
						gradational-indistinct; slight to mod.	
						petroliferous;	
795.63 - 795.8						Oil Shale highly petroliferous -	
						dark brownish grey;	
795.8 - 796.79						Claystone as before (790.5+)	
						but darker - 10 YR5/2 & slightly	
						petroliferous. (MAY HAVE HAD DOLOMITE EARLIER -	
						calcareousness is really effervescence) on fresh surface.	
769.79 - 816.79'						Recovery $\frac{9.9+10.4}{20} = \frac{19.94}{20}$	
						RQD = 100	
						PARTINGS 796.45	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P4 -CORE
DATE 10/28 TITLE SUN/PHILLIPS/SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED LAYNE WESTERN — GARDNER DENVER
LOGGED BY B. SIEMS

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
796-79' — 802.7'						SILTSTONE, clayey; 7.5 YR 6/2-5/2;	
						dolomite cement-clay; (effervesces	
						slowly until powdered); v. hard dolo-	
						mitic, v.f. laminated - blk to brown,	
						gen. flat - rarely undulating;	
						hydrocarbons - waxy feel & oily	
						surface when wet, odor; magnetitic	
						sandstone - 800.1-800.15;	
						800.5; black petroliferous beds - 800.75 -	
						800.8; 800.9-801.1;	
						siltstone as above - bed from 800.1-	
						800.75.	
						Partings - 801.05	
802.7-804.2						Siltstone & minor sandstone -	
						brown & grey; v.f. grained; calcite &	
						clay; v. hard, calcareous; v. thinly	
						laminated, v. even, undeformed, sharp	
						color contrasts at contacts; much of	
						sand is dark magnetitic;	
804.2-806.5						Siltstone & sandstone dominantly shades	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10/29 TITLE Sun/Phillips/Sohio
START ______ COMPLETE ______
EQUIPMENT USED Layne Western – Gardner Denver

BORING NO. P4 core
ELEVATION ______ DATUM ______
WATER LEVEL ______ AFTER ______
LOGGED BY B. Siems

pg 82

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						of brown, well sorted within laminae	
						or beds; carbonate cement & brown	
						hydrocarbons; (to 804.8 is siltstone)	
						(804.8 – 805.3 – SS with minor	
						siltstone) v. hard; v. thinly laminated	
						to thinly bedded (.2'); most is	
						v. thinly laminated; undeformed;	
						odor of hydrocarbons; 805.35 –	
						805.4 – v. bituminous sticky calcareous	
						siltstone.	
						Partings – 804.67; 805.35	
806.5 – 807.7						Sandy siltstone & claystone 7.5 YR	7/1
						& 6/4; light; grey/light brown; v. thin	
						dark grey laminae with magnetite;	
						sand odor;	
						Partings – 806.85	
807.7 – 813.3						Sandy siltstone – dominantly light grey	
						with thin black laminae & brown	
						laminae varying in frequency; v. fine	
						grained, carbonate and clay cement,	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P4 core

DATE 10/29/74 TITLE Sun/phillips/sohio

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED Layne Western - Gardner-Denver

LOGGED BY B. Siems

pg 83

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						v. thinly laminated - dominantly	
						undisturbed (810.5, 810.7, 810.8 -	
						thin laminae of disturbed material);	
						magnetitic sand in pods & of disturbed	
						bands; minor pyritic laminae;	
						petroliferous odor;	
813.3-816.2						Darker Zone - med dark grey &	
						brown; minor bedding offsets;	
						still petroliferous odor; v. thinly	
						laminated.	
						Partings - 814.55;	
816.2 - 816.79						V. light brownish grey; similar to	
						previous (806.5-807.7) - slightly	
						Sandy;	
						Partings 816.69	
816.79 - 836.79'						Recovery $\frac{20.18}{20}$	Descriptions very difficult
						RQD = $\frac{15.59}{20.18}$	and contacts
816.79 - 820.7						siltstone - same as much of previous	hard to pick
						core; light brown - med. brown,	due to black
						clay & carbonate cement; v. hard;	greasy surface

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P4 core
DATE 10/29/74 TITLE Sun/Phillips/Sohio
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED Layne Western Gardner Denver
LOGGED BY B. Siems

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						v. thinly bedded; slightly sandy;	
						petroliferous odor, slight effervescence -	
						likely dolomitic.	
						Partings - 818.28, 819.4, 819.75	FRACTURES; 820.32; 820.82
820.7 - 823.8						Oil shale - 5YR 3/2 - 3/3 - dark	
						reddish brown; hydrocarbon &	
						carbonate cement; v. hard; slight	
						effervescence; thinly laminated,	
						laminae distorted - undulating,	
						discontinuous, pinching, v. irregular	
						zone varies in hydrocarbon	
						content - rich to mod. rich to	
						slight;	
						Partings - 821.60	
823.8 - 824.2						Oil Shale - thinly & evenly laminated,	
						mod. petroliferous to highly petroliferous.	
824.2 ≃ 827						Siltstone - shaly - red brown, hard;	
						v. thinly & evenly laminated;	
						petroliferous - slight to moderate	
						Partings - 824.75, 825.75, 826.87, ~~[illegible]~~.	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10/29/74 TITLE Sun/Phillips/Sohio
START ____ COMPLETE ____
EQUIPMENT USED Layne Western - Gardner Denver

BORING NO. P4 CORE
ELEVATION ____ DATUM ____
WATER LEVEL ____ AFTER ____
LOGGED BY B. Siems
PJ 85

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
827–828.2						Oil shale - highly petroliferous	
						to mod. petroliferous; poor	
						zone 827.7–827.85; core	
						surface is very ~~rich~~ oily	
						and dark ~~brown~~ grey.	
828.2–829.5						Siltstone - lens of sand .01'	
						thick; surfaces of core - light	
						brown to dark grey;	
						~~parting 829.~~6.	
829.5–829.6						Sandstone highly bituminous -	
						dark grey	
						parting - 829.6	
829.6–830.3						Siltstone - probably like 828.2	
830.3–830.4						Sandstone - bleeding v. liquid dark	
						reddish brown hydrocarbon;	
830.4–833.3						siltstone and claystone - (.1' sandstone	
						at 832.4 - med grey) light brown	
						dominantly; laminated with shades	
						of brown, minor grey & black;	
						slight to mod. effervesces; carbonate	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10/29/74 TITLE Sun/Phillips/Sohio
START ______ COMPLETE ______
EQUIPMENT USED Layne Western - Gardner Denver

BORING NO. P4 CORE
ELEVATION ______ DATUM ______
WATER LEVEL ______ AFTER ______
LOGGED BY B. Siems

pg 85a

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						and clay cement, some hydrocarbons -	
						slight; v. hard; v. thinly laminated.	
						to thinly bedded; frequency	
						of dark black laminae increases	
						from 0% at top to ~5% at	
						bottom. sandy-minor;	
						Partings - 830.69, 831.8	
833.3 - 834.5						siltstone - red brown, interbedded	
						with thin laminae of grey sandstone;	
						~1' separation	
						Partings - 832.53, 833.66, 834, 834.3	
834.5-836.2 & 836.4-836.78						claystone light brown, sandy; highly	
						effervescent; minor grey sandstone	
						laminae; magnetite;	
						Partings - 834.6, 835.4, 835.83, 836.17,	
						836.78.	
836.2-836.4						Oil sand - black very petroliferous,	
						well sorted, v.f. grained.	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-4(core)

DATE 10-29 TITLE

ELEVATION DATUM

START COMPLETE

WATER LEVEL AFTER

EQUIPMENT USED Layne Western
Gardner Denver.

LOGGED BY Craner

P-86

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
836.79–		RQD.99			19.88/20.00	Siltstone w/ several interbedded	dark colore
856.79						Ss beds. ~~Color of siltstone~~	
						~~varied~~ and laminations of light	
						colored shale, C	
						Color of the Siltstone is	
						varied and changes vertically	
						from one lamination to another,	
						with no one area being more	
						distinction colorwise than another.	
						colores observed in the siltstone	
						are: 2.5Y 4/2, 2.5YR 4/2, 5YR 5/2 4/3	
						~~10YR~~ 7.5YR 4/3, 7/2, 10YR 6/2, 7/3, 6/3	
						10R 4/1, 7/2, 10R 4/1, 7/2.	
						of the sandstone, Colors are	
						Black to very dark gray.	
						Grain size of the siltstone	
						is very fine, Ss is fine, sorting	
						in each is to a high degree.	
						Cementation $CaCO_3$(?), very hard.	
						reaction to HCl is slight to moderate.	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74 068

DATE 10/29 TITLE

START COMPLETE

EQUIPMENT USED Layne Western
Gardner Denver 2000

BORING NO. P-4 Core

ELEVATION DATUM

WATER LEVEL AFTER

LOGGED BY Cranor

P-87

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
836.79 —						Bedding is mainly in the form	
856.79						of thin laminations with local	
						gross changes ~~in~~ over all color	
						ie from grays to browns,	
						Sandstones are in beds	
						from 0.5' to 0.1' thick with	
						uneven surfaces. Three	
						~~major~~ distinctive Ss beds	
						occur at: 845.2 (thinest)	
						845.3 (contorted, 0.2' thick)	
						~~854.~~ 854.75 (0.5' thick).	
						Laminations are most distinct	
						between 847 & 853	
						Parting Plains: 839.8, 841.60,	
						841.70, 845.15, 846.80, 849.30	
						849.80, 850.55, 851.15, 851.65,	
						851.90, 854.30, 854.9,	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

DATE 10-29 TITLE

START COMPLETE

EQUIPMENT USED Layne Western
Gardner Denver 2000

BORING NO. P-4 Core

ELEVATION DATUM

WATER LEVEL AFTER

LOGGED BY Cranor

P-88

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
856.79	R	QD	95		20.73 20.03	Siltstone, with thin beds of	
876.82						Shale and sandstone of varied	
						colors which are the same as described	
						above. Within the three rock	
						types found, they all are	
						well sorted, all are hard to	
						very hard. Reaction to HCl	
						varies from none to moderate	
						the most reactive being in the	
						non petroliferus siltstones.	
						bedding is from thinly laminated	
						to very thinly bedded. Several	
						areas through out the run is	
						found thin lenses, pods (algens),	
						and undulating beds. Between	
						870' and 871' occurrs a thin ss	
						bed that is moderately porus and	
						out gased while logging. The core	
						from 859' to 864' and 870' to 873'	
						is some what petroliferus.	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

DATE 10-29 TITLE Sun Phillips / SOHIO

START ____ COMPLETE ____

EQUIPMENT USED Layne western
Gardner Denver. 2000

BORING NO. P-4 Core

ELEVATION ____ DATUM ____

WATER LEVEL ____ AFTER ____

LOGGED BY Cranor - Sims

P-89

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
856.79			-			Plant fossil noted on	
876.82						parting plain at 864.2'	
						Parting Plains: 857.4,	
						858.5, 859.3, 864.2, 864.45,	
						864.85, 866.15, 866.20,	
						867.7, 870.65, 870.80, 870.85,	
						873.7, 875.3' Surfaces of	
						PP are un coated	
876.82-896.82				Recovery =		19.62/20 RQD = 17.87/19.62	
			Partings:				
			880.9		888.66	891.76 895.27	
			884.17		888.82	892.08	
			884.5		889.13	892.49	
			886.53		889.75	892.82	
			887.87		890.89	893.21	
			888.35		891.26	893.52	
			Upper portion of core greasy again: probably				
				from grease in core barrel;			

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P4 cor
DATE 10/29 TITLE Sun Phillips / SO H10
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED Layne Western - Gardner Denver
LOGGED BY B. Siems

90

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
876.82-877.9						Oil shale & Sandstone - 7.5YR 3/1-3/2; mostly shale; Sandstone v. 1" at top; v. dark; v.f. grained ss; well sorted; hydrocarbon & carbonate cement; v. hard; v. finely laminated; undeformed; carbonate probably dolomitic;	
877.9-883.4						Sandy siltstone - many shades of gray & pinkish grey & brown; sand - v. f grained; clay & carbonate cement; v. hard - hard; magnetite grains as sand - some concentrations; v finely laminated thinly bedded; contacts may be abrupt or gradational; Slight to mod. petroliferous at 879.35-.65, .8; 880.05-.4; 881.9-.95;	
883.4-887.4						Petroliferous siltstone - 5YR 4/1 - 5YR 5/2 dark grey to reddish gray; carbonate, hydrocarbon & clay cement; v. hard; carbonaceous - dolomite?; v. finely laminated to thinly bedded, undeformed; some lensing laminae; slightly petroliferous to highly petroliferous - ave. less than moderate;	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10/79 TITLE Sun) Phillips ISA#10
START ___ COMPLETE ___
EQUIPMENT USED Layne Western Gardner Denver
BORING NO. D-4 (core)
ELEVATION ___ DATUM ___
WATER LEVEL ___ AFTER ___
LOGGED BY B. Sims

91

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
887.4–888.4				oil shale		sandy -dark reddish grey to black; v. thinly laminated; Carbonate, clay & hydrocarbon cement; v. hard; dolomitic?; v. thinly laminated some terminated; generally undeformed; magnetite sand; highly petroliferous; magnetite present also as Xls - disoriented needles	
888.4 – 890.6				siltstone		10YR5/2-6/1; grey to grayish brown; carbonate cement; v. hard, hard; ~~[illegible]~~ calcareous - may be dolomitic also; v. tiny pod-pellet shaped calcite concentrations (<<.01'); v. thinly laminated to thinly bedded; magnetite-concentrated in beds & disseminated;	
890.6 – 896.82				siltstone -claystone		as above; ~~magnetite~~ generally lighter colored 10YR 6/1-6/2; hard; calcite & dolomite cement, clay; calcareous & dolomitic?; v. thinly laminated to thinly bedded - contacts gradational to abrupt; magnetite beds & fillings in joints? or fractures? - irregular trace on core surface, but regular trends - 1 to 2 directions cutting bedding planes;	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P4 core
DATE 10/29 TITLE Sun Phillips/SOHIO
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED Layne Western Gardner Denver
LOGGED BY B. Sims

92

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	

also concentrated in pods ~.02' x .05';
lineations may be formed at time of deposition
or later; pyrite; may have formed & then
been offset by bedding plane movement;
3? ← sim. to that; One set measured at 60° to
~~vert~~ horiz.; mag. is v.f. grained;

896.82' - 916.78' Recovery = 20.16/19.96 RQD = 19.74/20.16
896.82' - 900.3 - same as above, bedded thinly - Contacts freq. indistinct
899.15 - 899.85 - laminae highly irregular, probably
originally deposited irregular more than
deformed; ~899.6 - claystone with siltstone -
very irregular deformed contact;
~~899.85~~ all of above has much magnetite - as
beds, splotches, & disseminated;

~~900.5~~ -
900.3 - 905.7 siltstone - shaly at times; between 5YR 4/1 & 4/2 -
dark grey to dark reddish grey; & lighter shades
to 7/1 & 7/2; overall is more light brown than
gray; carbonate & Fe oxide cement, probably
some hydrocarbons; mod. to slight effervescence
even scratched; ~~magn~~ v. thinly laminated to

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-4 core
DATE 10/29 TITLE Sun/Phillips/Sohio
ELEVATION
DATUM
START
COMPLETE
WATER LEVEL
AFTER
EQUIPMENT USED Wayne Western - Gardner Denver
LOGGED BY BOBBIE SIEMS

93

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						v. thinly bedded - contacts gen. more distinct	
						than above; magnetite & pyrite - less abundant	
						than above but still common;	
						905.15 - becoming darker - some bleeding hydrocarbons	
						905.7 - 908 oil shale dark reddish brown; mod. petroliferous	
						slightly calcareous; calcite & hydrocarbon cement;	
						v. hard; v. thinly laminated; pyrite	
						908 - 909.4 - siltstone reddish gray; with magnetite & pyrite	
						laminae <10%; v. hard; non calcareous;	
						909.4 - 911.3 - siltstone -claystone 5YR6/1 - 6/2 gray to pinkish gray;	
						v. thinly laminated to v. thinly bedded - beds	
						actually v. thin less distinct laminae; hard;	
						carbonate & clay cement; rare pinching hydrocarbon	
						stringers; still minor magnetite - v.f. sand size	
						grains	
						911.3 - 915.6 - oil shale & siltstone - 5YR 3/2; carbonate &	
						hydrocarbon cement; v. hard w. waxy feel; dolomitic?	
						~~913.[illegible]7 & 9~~ v. thinly laminated; 913.7 & 914.15 -	
						zones where laminae irregular; (.1 & .3' respectively)	
						914.82 - 915. oil sand - bleeding; pressure caused	

sand to bulge & crack; also 915.2 ~ .01';

NOTES: 915.4 - .1' oil sand

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P4

DATE 10/29 TITLE

ELEVATION DATUM

START COMPLETE

WATER LEVEL AFTER

EQUIPMENT USED Layne Western Gardner Denver 2000,

LOGGED BY Cranor

94

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
915.6-916.78						claystone-marlstone? - 5YR 7/2-6/2; Calcite & clay cement; v. thinly laminated to laminated; m hard; minor magnetite beds;	
916.78 – 919.4		RQR=99.9			19.90 / 19.97	very fine Siltstone, Lt. gray 5YR 7/1 pinkish gray 5YR 7/2, Lt. reddish brown 5YR 6/4 little to no reaction to HCl, hard to very hard. bedding is very thin thinly laminated to laminated generlly thinner nearer 919'.	
919.4 – 922.6,						Very fine grained siltstone w/ three thin, deformed beds of Ss containing moderate to little petroilum. siltstone is black ~~bedding~~ beds is well sorted, non Calcareous, very hard. Between 919.4' and 921' the bedding is well defined, based on Slight color changes and undulation -	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-4 Core

DATE 10-30 TITLE

ELEVATION DATUM

START COMPLETE

WATER LEVEL AFTER

EQUIPMENT USED Layne Western
Gardner Denver 2000

LOGGED BY Cranor

95

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
919.4 -						920.6, Near bottom of undulated	
922.6						portion of this section is a	
						0.1' thick ss bed containing	
						moderate amount of petroleum.	
						at 922.3' free oil along a	
						parting plain.	
						Minor amounts of FeS_2 in	
						the form of very small flakes	
						occurres in the siltstone.	
922.6 —						Interbedded Siltstone and ~~Shale~~ Calcarious Shale	
928.4						Very pale brown 10 YR 7/3,	
						brown 7.5 YR 5/2, light gray 10YR 7/1,	
						gray 10YR 4/1. very fine grain to	
						clay size grains, well sorted,	
						cement - $CaCO_3$, reaction to HCl	
						moderate.	
						Bedding - thinly laminated to very	
						thinly bedded.	

NOTES:

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10/30 TITLE
START COMPLETE
EQUIPMENT USED Layne western
Gardner Denver 2000

BORING NO. P-4 Core
ELEVATION DATUM
WATER LEVEL AFTER
LOGGED BY Cranos

P-96

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
928.4 -						Very fine siltstone gray 10YR 6/1	
936.74						dark gray 10YR 3/1, well sorted,	
						Cement - $CaCO_3$, Very hard,	
						reaction to HCl - moderate to	
						weak., bedding - thin lamination	
						rare biotite books < 1/2 mm.	
~~936.74'~~						Parting Plains: 916.8, 916.9,	
						918.5, 920, 921.9, 922.3	
						923.3, 923.5, 926.35	
						926.9, 927.3, 927.6, 928.85	
						930, 931.6, 933.1, 934.	
						935.8,	
936.74'					20.20 19.97	fine siltstone with thin laminations	
941.80'						of Shale, Lt. gray 2.5Y 7/2, Lt. gray	
						10YR 7/1, very pale brown 10YR 7/3,	
						well sorted, Calcite cement, hard	
						moderate reaction to HCl.	
						Bedding mostly thinly laminated.	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-4 Core
DATE 10-30 TITLE
ELEVATION DATUM
START COMPLETE
WATER LEVEL AFTER
EQUIPMENT USED Layne Western
Gardner Denver 2000
LOGGED BY Cranor

P-92

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
936.74						From 936.74' - 937.5' many small,	
941.80						horiz. oriented, gray spots, SiO_2	gel (?)
						Same material fills small vertical	
						subparallel frx. 0.1' long,	
941.80						very fine Siltstone ~~as above~~.	
952.35						gray 10YR 5/1, to dusky red	
						laminations 2.5YR 3/2, well sorted	
						very hard to hard, very slight	
						reaction to HCl. Thinly laminated	
						irregularly shaped blibs,	
						mostly vertical, of marcasite	
						occur in this section about	
						5-8% of core (?) last 1.4'	
						of section FeS_2 is less abundant	
						and laminations more pronounced.	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74 - 068

BORING NO. P4 Core

DATE 10-30 TITLE

ELEVATION DATUM

START COMPLETE

WATER LEVEL AFTER

EQUIPMENT USED

LOGGED BY Cranor

P-98

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
952.35 –						Inter bedded laminations of	
952.55						Shale, very pale brown 10YR 7/3	
						and very dark grayish brown 10YR 3/2	
						$CaCO_3$ cementation, moderately hard,	
						slight reaction to HCl.	
						easily cleaved along contacts	
						of shale laminations, which	
						are slightly uneven,	
952.55						Sandstone - 5Y 6/1 gray; v. f. grained-med. grained	
						well sorted; calcite cement; mod. hard	
						to hard; mod. calcareous; v. fine laminated	
						to v. thinly bedded; ripple beds in places;	
						others flat, thin laminations; micaceous -	
						mica throughout as well as concentrated along	
						beds; magnetitic; v. f. grained - present	
						throughout;	

NOTES:

FUGRO

7-23-73 L-0

FIELD LOG OF BORING

PROJECT NO. ______
BORING NO. D4 core
DATE ______ TITLE ______
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED ______
LOGGED BY ______

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
956.71 – 956.85						Silty Claystone – 10YR6/1 – 10YR6/2; light brownish	
						gray to gray; carbonate & clay cement;	
						mod. hard to hard; calcite & dolomite?;	
						thinly laminated; undeformed; magnitite	
						sand – minor;	
956.85 – 958.4						Petroliferous Siltstone 5YR3/1 v. dark gray with	
						reddish caste; v. fine grained; v. minor carbonate	
						cement & hydrocarbons; hard – v. hard; v. finely	
						laminated – irregular uneven discontinuous	
						~ horiz laminae; mod. ~~[illegible]~~ petroliferous;	
958.4 – 961.65						Siltstone – 7.5YR 5/2 brown; hydrocarbon & minor	
						carbonate cement; hard – v. hard; sl. dolomitic?;	
						v. thinly laminated – ~ even color; non deformed;	
						red brown crystalline hydrocarbon & magnetite sand bed:	
						959.61; also 960.17; both ~.02-.03' thick;	
						only a slight effervescence even scratched;	
961.65 – 969.5 –						Marlstone? with minor Claystone; Siltstone varicolored: 7.5YR 8/2 (pinkish white) 7.5YR 7/2	
						(pinkish gray) 10YR 6/1 (gray) 10YR 5/1 brownish gray; v. thinly	
						laminated to v. thinly bedded; carbonate & clay, minor	
						hydrocarbons in selected beds; calcite; v. effervescent;	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO.

BORING NO. D4

DATE

TITLE

ELEVATION

DATUM

START

COMPLETE

WATER LEVEL

AFTER

EQUIPMENT USED

LOGGED BY

100

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						pyrite? or marcasite disoriented sand-size plates &	
						needles; hydrocarbons - minor; & decreasing dark	
						laminae toward bottom;	
969.5 - 970.95						Sandy siltstone - shaly; 10YR5/2 grayish brown; brownish gray;	
						calcite cement; v. hard; v. effervescent; dominantly	
						thinly bedded with indistinct internal v.f. laminations;	
						very magnetitic; also pyrite; magnetite - disseminated,	
						as beds; & in "veins";	
970.95 - 976.71						Siltstone sim. to above; laminations more distinct - v. thinly	
						laminated browns to grays; dominantly brownish	
						gray; magnetite laminae, also pyrite; marcasite? pod -	
						grown in place from both sides to center - along	
						bedding, v. .01' thick; also magnetite "veins" - v. fine	
						grained concentrations crossing the bedding;	
			Partings;			958.5, 959.61, 960.91; 962.16; 963.85; 965.59;	
						966.57; 967.18; .45; 968.55; 969.67; 970.52;	
						971; 973.83;	
976.71 - 996.69					Rec	19.9/~~19.~~19.98 19.56/19.98 = RQD	
			Partings			977.25, 979.9, 982.4, 983.3, 983.55, 984.2, 986.5	
						989.86, 990.25, 992.21, 994.5, 994.9, 996.32, 996.65	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P4 Core

DATE 10/30 TITLE Sun Phillips

ELEVATION ______ DATUM MSL

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED Layne Western

LOGGED BY ~~B. Sims~~ Novak

/101

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
976.6 –						Siltstone 3/2 5YR dark reddish br.	
980.4						w/bands 5/2 7.5R brown, hard, non-	
						v. slightly calcareous, laminated, w/ <1%	
						pyrite, gradational lower contact	
						r	
977.53						Siltstone, 5/2 7.5R 0.02' thick as	
						above but w/ 4% pyrite, fracture	
						due to differential compaction	
980.40 –						Siltstone 3/2 5YR dark reddish br	
988.74						hard, non calcareous, v thinly laminated	
						w/ pyrite increasing downward, maximum	
						5%, very homogeneous. some magnetite	
						gradational lower contact	
984.20						Pyrite healed fracture	
985.48						Blebs of Marchisite .01' x .02'	
						in linear horizontal string	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-4 core
DATE 10/30/74 TITLE Sun Phillips
ELEVATION ____ DATUM MSL
START ____ COMPLETE ____
WATER LEVEL Dry AFTER ____
EQUIPMENT USED Layne Western, Gardner Denver 2000
LOGGED BY Novak

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
988.74-						Siltstone, 4/4 7.5YR, brown, hard	
991.05						v. slightly calcareous, laminated w/	
						many lenses up to .03' thick. Lenses	
						are Sandy Siltstone w/ f gr sand 5-	
						8% pyrite, 2% magnetite. Gradational	lower contact
988.86						Laminae, black, of magnitite, :	
						Magnitite increasing downward 3-4%	
						maximum	
991.05 -						Siltstone 4/2 7.5YR brown, hard,	
995.09						v. slightly calcareous, thinly laminated	
						w/ 1% pyrite, 4-5% magnetite, magnetite	
						healed fractures, occassional laminae	
						of sandy siltstone, f gr sand w/ 8-10%	
						magnetite, and thin laminae of magnetite	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-4 core
DATE 10/30/74 TITLE Sun Phillips
ELEVATION E DATUM MSL
START COMPLETE
WATER LEVEL Dry AFTER
EQUIPMENT USED Layne Western Gardner Denver 2000
LOGGED BY Novak

Page 10-3

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
991.05-						Siltstone (cont)	
995.[illegible]9							
(cont)							
994.90						Silty Sandstone black, 0.04' thick	
						vf-f grain, subangular, poorly sorted,	
						noncalcareous w/ 1-2% pyrite, 10-15%	
						magnetite, parting plane along upper	
						contact. Depositional contacts, top and	
						bottom	
995.9-						Siltstone, 5/2 7.5YR brown, hard	
996.69						slightly calcareous, thinly laminated	
						w/ 1% pyrite and some laminae	
						of sandy siltstone w/ 3% magnite	End of
						vf grain sand	core
						gradational upper contact	run
							996.69

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10/31/74 TITLE Sun Phillips
START ______ COMPLETE ______
EQUIPMENT USED Layne Western, Gardner Denver 2000

BORING NO. P-4 core
ELEVATION ______ DATUM MSL
WATER LEVEL dry AFTER ______
LOGGED BY NOVAK

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
996.69-					→	Missing 0.12' recovery here	
996.81							
996.81-						Parting planes horizontal, 997.89	
1016.63						999.44, 1000.12, 1000.77, 1001.65	
						1003.52, 1004.88, 1006, 1006.58,	
						1006.67, 1008.80, 1008.96, 1009.48	
						1010.52,	
						Fractures "V" shape 1000.93	
						1000.48	
996.81-						Inter~~bedded~~laminated Sandy Siltstone 5/2 7.5YR	
998.7						brown, hard, slightly calcareous w/<1%	
						pyrite, laminated and Silty Sandstone	
						7/2 2.5Y lt. gray, fine grain, subangular	
						poorly sorted, calcite cement w/1%	
						magnetite and Claystone, 6/4 7.5YR	
						mod hard, slighty calcareous thin bedded	
						Silty SS and Sdy Siltstone lamanae contacts	
						gradational. Claystone contacts depositional	

Bottom contact, convoluted depostional

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-4 core
DATE 10/31/74 TITLE Sun Phillips
ELEVATION ______ DATUM MSL
START ______ COMPLETE ______
WATER LEVEL Dry AFTER ______
EQUIPMENT USED Layne Western Gardner Denver 2000.
LOGGED BY Novak

Page 105

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
998.7-						Inter~~bedded~~ laminated Siltstone, 5/2 7.5YR brown	
1001.2						mod hard slightly calcareous, laminated	
						and Claystone 6/4 7.5YR lt. brown	
						mod hard, slightly calcareous, laminated	
						w/ <1% pyrite, magnetite	
						gradational lower contact	
1001.2 -						Siltstone 4/2, 2.5Y, dk grayish brown	
1006.15						hard, slightly - mod calcareous, laminated	
						w/ 5-8% magnetite, <1% pyrite	
						depositional lower contact	
1004.79						Clayey Sandstone 0.13' thick, black-greenish	
						black vf-f grain, subangular, poorly	
						sorted, clay cement? w/ 30% magnite	
						1% pyrite, Depositional upper and	
						lower contacts	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

DATE 10/31/74 TITLE Sun Phillips

START COMPLETE

EQUIPMENT USED Layne Western Gardner Denver 2000

BORING NO. P-4 core

ELEVATION DATUM MSL

WATER LEVEL Dry AFTER

LOGGED BY NOVAK

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1006.15-						Inter~~bedded~~ laminated Silty Sandstone 5/2 2.5Y	
1006.89						grayish brown, fine grain poorly sorted	
						subangular and relatively no ~~trace~~ accessory	
						minerals and Sdy Siltstone - Siltstone	
						w/same characteristics, laminated	
						Depositional lower contact	
1006.89-						Interlaminated 4/4 7.5YR dk brown	
1011.80						hard slightly calcareous w/ 2% magnitite	
						1% pyrite with Claystone 6/4 7.5YR	
						lt brown mod hard, slightly calcareous	
						w/relative no accessory minerals	
						gradational lower contact	
1010.44						Sandy Siltstone .08' thick black	
						f grain w/3-5% pyrite clayey	
						cement, displays crossbedding	
						Upper contact gradational, lower	
						contact depositional	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10/31 TITLE Sun Phillips
START ______ COMPLETE ______
EQUIPMENT USED Layne Western Gardner Denver 2000
BORING NO. P-4 core
ELEVATION ______ DATUM MSL
WATER LEVEL Dry AFTER ______
LOGGED BY Novak
Page 10~~7~~

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1011.80–						Siltstone 6/0 7.5YR, lt gray	End of
1016.63						hard, slightly calcareous, laminated	core
						w/ 7-10% magnetite? marchisite	Run
						<1% pyrite	1016.63
1016.63 – 1036.60						Recovery 20.06/19.97 RQD 13.72/20.06	
						*Note: Last core run measurements off by 0.09'	
						1015 is really 1014.91	
~~1016.54 – 1019.53~~							
		Parting Planes:				Fractures:	
		1017.85			1025.69	1017.58 – ~60° to horiz	
		1018.28			1025.9	1018.07 ~40°	
		1018.43			1026.77	1018.78 ~35°	
		1020.62			~~10.27.~~	1027.26 - lowL	
		1020.8			1028.4	1033.95 ~45°	
		1021.21			1031.6	1034.96 ~45°	
		1023.98			1038.45		
1016.54–		1020.~~3~~ 62				Shale 5Y3/2 dark olive gray; clay & minor hydrocarbon?	
						& v. minor carbonate; hard; non calcareous	
						to v. slightly effervescent; v. thinly laminated–	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P4 Core

DATE 10/31 TITLE Sun Phillips, ISOH10

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED Layne (Western) Christensen Denver

LOGGED BY B. Sim

P. 108

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
				undeformed;		~~sand~~ stone laminae & beds at: 1017.96	(.02') ~~1019.25~~
					~~8~~ 1010.94(.01'),	1018.28(.02'), 1018.43 (.03'),	1019.45(.04'), 1020.12
					(.15');	dark gry, magnetitic, probably some	hydro-
					carbons;	v.f. grained; clay cement?; mod.	hard;
					tendency	for partings to occur at	lower
					contact;	contacts v. slightly irregular;	
				tiny	pyrite? &	magnetite? needles in both	rock types
1020.62 - 1020.8				sandstone	with	~~claystone~~ shale inclusions - dark	gray to
					olive	brown (inclusions); v.f. grained,	hydro
					carbon	cement; hard; non calcareous;	pyrite
					1-2%?;	black streaks & laminae of	hydro-
					carbons;	thinly laminated, highly	deformed;
1020.8 - 1023		34		siltstone		5Y5/1 gray; 5Y7/2 light gray; 2.5Y	4/2 - dark
					grayish	brown; 5Y3/2 dark olive gray;	browner
					near top,	grayer near bottom; calcite	cement,
					probably	minor hydrocarbons; mod-v.	calcareous;
					magnetitic	(v.f. sand size) & pyrite; fills	fractures,
					occurs	in beds, & is disseminated;	increases in
					% toward	bottom; to 15%?; v. thinly	laminated-
					flat-	undeformed; rare filled fracts;	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P4

DATE 10/30 TITLE Sun Phillips, Sohio

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED Layne Western - Gardner Denver

LOGGED BY B. Siems

P 109

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1023.34 - 1024.19						Siltstone 2.5Y 7/2, 6/2 & 5/2 light gray to grayish	
						brown; well sorted; cement - clay & hydrocarbons;	
						mod-hard; v. sl. effervescent in places; v. thinly	
						laminated; thinly laminated undeformed; magnetite - % unknown;	
						v. fine grained;	
1024.19 - 1026.5						Siltstone - as 1020.8 - 1023.34 - dom. gray; magnetite	
						sand beds at 1025.69, .9, 1026.07,	
						7.5YR 8/4 - v. calcareous claystone - v. irregular laminae	
						~ 1026.07 - 1026.13; beds have rounded irreg.	
						tops as algal strs or pods;	
1026.5 - 1029.5						Sandstone - light gray to gray; v. f. grained;	
						contains light brown clay laminae - v. minor - near top;	
						mod. sorting; calcite & clay cement; hard; v. thinly	
						laminated to laminated; gradational contacts;	
						~~beds~~ laminae wavy - as ripple bedding at times - v. low	
						angle & laminae frequently horizontal; mod to v. calcareous;	
						1027.6 - claystone breccia - claystone frags in SS; to	
						.02', angular to subrounded;	
1029.5 - 1032.5						Siltstone - light gray to gray, v. thinly laminated &	
						even colored; v. minor clay laminae near bottom	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P4 core
DATE 10/31 TITLE Sun Phillips ISOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED Layne Western - Gardner Denver
LOGGED BY B. Siems

p 110

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						Sim to SS above but finer grained & laminae horizontal	
1031.5 - 1032.3						thin interbedded laminae of siltstone, oil shale (low grade) (minor %) & claystone; 5YR 7/1 - 6/1 - 4/2 - 4/1 - 7.5YR 9/2; mainly siltstone; calcite & hydrocarbon? cement; hard; slight to mod. calcareous; v. thinly laminated (horiz.); magnetite - disseminated & laminae;	
1032.3-1032.35 25 10295 → ~~1032.3-1032.35~~						~~pink~~ gray claystone - 7.5YR 8/2; calcite cement; v. thinly	
1033.35 - 1033.65						laminated - undeformed except 2 dk grey sand laminae (~1032.45) enclose brecciated claystone; magnetitic;	
~~1033.35~~							
1033.65 - 1036.4						Shaly siltstone gray, with minor pinkish white & pinkish gray claystone laminae near bottom & dark gray v.f. sandstone laminae; SS - magnetitic; cement - calcite & minor hydrocarbons? & clay?; mod to v. calcareous; SS at 1034.4 - contains angular siltstone frags nearly in place - fragmented bed filled around with black v.f. sand;	
1036.4 -						Sandstone - gray, v.f. grained, thinly laminated to thinly bedded; sl. calcareous;	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10/31 TITLE Sun Phillips/SoHio
START ______ COMPLETE ______
EQUIPMENT USED Layne Western
Gardner Denver

BORING NO. P4 core
ELEVATION ______ DATUM ______
WATER LEVEL ______ AFTER ______
LOGGED BY B. Sim
P111

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1036.6-1056.6				Recovery		19.82/20 RQD 19.52/19.82	
			Parting		Planes	FRACTURES	
		1037.25			1046.5	~~[illegible]~~	
			.82		~~[illegible]~~	1055.35	
		1038.48			1050.3	1055.65	
		1040.55			1052.35	1056.05	
		1042.8			1052.57		
			.85		10		
		1044.21					
		1044.46					
1036.6-1037.2		Sandstone-2.5YR7/1				v.f. grained, slightly calcareous-carbonate cement; v. hard; mod. calcareous; v. thinly laminated to v. thinly bedded; undeformed; micaceous; magnetite;	
1037.2-1042.5		Sandstone siltstone & ~~mudstone~~ claystone - interbedded;				5Y6/1 & 5/1 & 7/1; claystone 5Y8/2; v.f. grained; calcite & clay cement; most is Sandstone & siltstone - claystone is minor; sl. to mod calcareous - mainly slight; 3 highly petroliferous laminae - 1037.3, 1039.05, 1040.1 (~0.02' thick); hard to v. hard; v. thinly laminated - thinly bedded; compaction offsets, rare minor deformation cuts small sects of core; claystone laminae are woven-like algal structures; mica & magnetite	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 10/31 TITLE Sun Phillips 5E41C
START ______ COMPLETE ______
EQUIPMENT USED Layne Western / Gardner Denver
BORING NO. PY core
ELEVATION ______ DATUM ______
WATER LEVEL ______ AFTER ______
LOGGED BY B. Siems
p112

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						below) 1040.5 - Claystone is very minor; - decreases in amount with depth;	
1042.5-.7						Claystone - creamy white, as above, irregular hummocky top as algal structure; dolomitic, with magnetite laminae; offset (.01') within zone;	
1042.7-1043.26						Siltstone - sim. to before - sandy; gray, v.f grained, sandy, magnetitic; carbonate cement, v. thinly laminated	
1043.16-.26						Claystone with magnetite laminae as 1042.5	
1043.26 - 1043.8						Sandstone - silty gray, very even colored; v.f. grained, well sorted; carbonate cement; mod. hard to hard; mod calcareous; v. thinly laminated to thinly bedded; some of ~~the~~ laminae are highly distorted, many are even; magnetite occurs throughout in bedding - also minor amts as fracture fillings; becomes finer grained & more evenly laminated lower in the section;	
~~1042.3~~ - 1044.21 - 1044.46						Sandstone - dark grey brown; med. grained, tuffaceous;	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P4 core
DATE 10/31 TITLE Sun Phillips
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED Layne Western / Gardner Denver
LOGGED BY B. Siems

113

DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
1048.8-1050.25						Siltstone- 5Y3/1 v. dark gray; gradational contact; carbonate cement, also clay; v. thinly laminated- rare deformed beds; hard; v. slightly micaceous; slightly petroliferous- content increasing to moderate at center of section & decreasing toward bottom;	
1050.25-1052.1						Siltstone- 7.5YR 4/1 with minor 7.5YR 4/2 dark gray to dark brown; v.f. grained; carbonate cement; minor bitumens; mod. hard to hard; mod. calcareous; v.v. thinly laminated; magnetite, micaceous; grades into bed below- laminae become thicker, more distinct in next bed, carbonate content increases	
1052.1-1056.6						- Siltstone 7.5YR 6/1 & 6/2 gray & pinkish gray; sim. to above - grading from above into finer grained, more clayey material; beds thicken downward & brown more clayey material increases, sand size magnetite decreases; becomes more calcareous; 1052.55 - marcasite layer .01' thick; toward bottom red brown slightly petroliferous mat'l begins to occur;	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-4 core
DATE 11/1/74 TITLE Sun Phillips
ELEVATION ______ DATUM MSL
START ______ COMPLETE ______
WATER LEVEL Dry AFTER ______
EQUIPMENT USED Layne Western, Gardner Denver 2000
LOGGED BY Novak

114

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1056,6-						Parting planes horizontal 1059.4	
1076.67						1061.17, 1064.08, 1065.35, 1065.8	
						1068.18, 1069.61, 1070.16, 1070.37	
						1071.3, 1071.37	
						Fracture 30° 1073.23	
056.6-						Gradational contact w/ rock described	
1063.13						at 1052.1 @ 1056.6	
						Siltstone 6/2 2.5Y light brownish	
						gray - 4/2 2.5Y dk brownish gray	
						hard, v. slightly calcareous, thinly	
						laminated w/ relatively no accessory	
						minerals and silty sandstone, white,	
						vf grain, subangular, poorly sorted	
						silty cement w/ <1% pyrite magnetite	
						gradational lower contact	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-4 core
DATE 11/1/74 TITLE Sun Phillips
ELEVATION ______ DATUM MSL
START ______ COMPLETE ______
WATER LEVEL Dry AFTER ______
EQUIPMENT USED Layne Western, Gardner Denver 2000
LOGGED BY Novak

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1063.13-						Interlaminated Siltstone 3/2 10YR	
1064.58						hard, non calcareous, thinly laminated	
						w/ < 1% pyrite and silty Sandstone	
						8/4 10YR, vf - f grain subangular, poorly	
						sorted, laminated and in lenses w/ <1%	
						pyrite w/ thin laminae of magnetite	
						non calcareous	
						Last 0.15' is silty sandstone - sandy	
						siltstone 3/2 10YR f grain,	
						Bottom contact depositional	
1064.17						Silty sandstone black 0.06' thick	
						f grain poorly sorted, subangular	
						silty cement w/ 15% magnetite	
						< 1% pyrite. Depositional contacts	
1063.9						Silty Sandstone as above	
						but w/ erosional lower conact	
						0.01' thick	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-4 core
DATE 11/1/74 TITLE Sun Phillips
ELEVATION ____ DATUM MSL
START ____ COMPLETE ____
WATER LEVEL Dry AFTER ____
EQUIPMENT USED Layne Western, Gardner Denver 2000
LOGGED BY Novak
Page 116

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1064.58-						Siltstone 6/2 2.5Y lt brownish gray	
1068						4/2 .2.5Y dk brownish gray, hard	
						non-calcareous, thinly laminated. w/	
						almost no accessory minerals and	
						siltstone 8/4 10YR hard, non calcareous	
						laminated. Section highly disturbed	
						laminae is often truncated and/or	
						broken and filled consequently by	
						the same material. ~~Undisturbed laminae~~.	
						Erosional remnants are abundant	
						~~possibly~~ Undisturbed laminae often	
						separated by erosional surfaces	
						depositional contact	
						Possible worm burrows 1064.9	
						1067.25 0.2 x 0.05'	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-4 core
DATE 11/1/74 TITLE Sun Phillips
ELEVATION ______ DATUM MSL
START ______ COMPLETE ______
WATER LEVEL Dry AFTER ______
EQUIPMENT USED Layne Western, Gardner Denver 2000
LOGGED BY NOVAK

Page 117

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1068.0 – 1071.37						Inter laminated silty sandstone 6/0 2.5Y gray f grain, poorly sorted subangular, non calcareous, w/ relatively no accessory minerals, laminated and in lenses and stringers and siltstone - sandy siltstone gray, hard non calcareous sometimes displays grading upwards to silty SS depositional bot. contact)	
1068.8						0.40' interval w/ worm borrows 0.1x0.2' in siltstone filled w/ sdy silstone w/ .01x.01 frags of silty sandstone	
1070.30						0.3' interval mostly silty sandstone lenses ss lenses + laminae decreasing downward almost nil	
1071.3						Sandstone gray, 0.05' thick, m grain poorly sorted subangular, siliceous cement w/ 1-2% pyrite, 2% magnetite, depositional contacts	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-4 core
DATE 11-1-74 TITLE Sun Phillips
ELEVATION ______ DATUM MSL
START ______ COMPLETE ______
WATER LEVEL Dry AFTER ______
EQUIPMENT USED Layne Wester Gardner, Denver 2000
LOGGED BY Novak
Page 118

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1071.37-						Siltstone 5/1 5Y gray, hard, non	
1073.0						calcareous, laminated w/ <1%	
						pyrite, & nacholite stringer	
						gradational bottom contact	
1073.0-						Siltstone, dk reddish brown, hard,	
1074.68						noncalcareous, laminated and displays	
						some fines grading upward w/ 1% pyrite	
						w/ ~~F~~ 0.3' vertical filled voids containing	
						erosial remnants silty sandstone frags	
						marchisite blebs. disturbed in	
						much the same way as at	
						1064.58. Depositional lower contact	End of
							core run
1074.68-						Siltstone as above at 1071.37	1076.67
1076.67						but without nacholite	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068 BORING NO. P-4 core

DATE 11/1/74 TITLE Sun Phillips ELEVATION ____ DATUM MSL

START ____ COMPLETE ____ WATER LEVEL Dry AFTER ____

EQUIPMENT USED Layne Western, Gardner Denver 2000 LOGGED BY NOVAK

Page 119

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
* 1076.67 - 1096.6						Parting planes horizontal, 1087.42 1089.05, 1089.54, 1092.08, 1092.12	
1076.67 - 1077.06						Siltstone 5/1 5Y gray hard, non-calcareous, laminated w/< 1% pyrite gradational bottom contact	
1077.06 - 1083.16						Siltstone 3/1 10R, dk reddish gray hard, non calcareous, thinly laminated highly - v. highly petroliferous w/1% pyrite and blebs of Sandstone dk brown, f grain poorly sorted subangular clayey cement 0.02 x 0.12' Erosional lower contact	
1078.82						Black Tar Sandstone, f gr bleeding tarry oil. Can not see detail Erosional contacts top and bottom 0.08' thick	
1081.0						Siltstone as above but with several very pale brown claystone laminae for a 1.0' interval	

NOTES: Due to 100% plus recovery on this and the last run, the last run, 1056.6 - 1076.67, should move its measurements back 0.35'

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-4 core
DATE 11-1-74 TITLE Sun Phillips
ELEVATION ________ DATUM MSL
START __________ COMPLETE __________
WATER LEVEL Dry AFTER __________
EQUIPMENT USED Layne Western, Gardner Denver 2000
LOGGED BY Novak

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1083.16-						Silty Sandstone - Sandy Siltstone	
1084.19						5/2 5YR reddish gray - 6/1 5YR	
						pinkish gray, f grain, poorly sorted,	
						subangular) w/ <1% gilsonite magnetite	
						lenses, stringers, laminae, 25% of the	
						time, they grade into each other, silty cement	
1083.31						Erosial surface which slopes at 20°	
1084.0						Silty Sandstone 0.19' thick, 6/1 5YR	
						pinkish gray as above but w/	
						secondary solution cracks .001 - .01'	
						wide replaced w/ clay	
						depositional upper and lower contacts	
1084.19 -						Sandstone black, f grain, subangular	
1084.48						poorly sorted, highly petroliferous	
						petroliferous cement w/ 1% gilsonite	
						Depositional lower contact w/ some	
						minor solutioning effects	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-4 core
DATE 11/1/74 TITLE Sun Phillips
ELEVATION ______ DATUM MSL
START ______ COMPLETE ______
WATER LEVEL Dry AFTER ______
EQUIPMENT USED Layne Western, Gardner Denver 2000
LOGGED BY Novak

Page 121

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1084.48						Siltstone 4/3 5YR, reddish brown and	
1087.42						4/1 5G bluish green, hard, non calcareous	
						thinly laminated w/ v minor accessory	
						minerals erosional bottom contact	
1087.42-						Sandstone 4/2 2.5Y, dark grayish	
1087.44						brown, f-m grain, poorly sorted, subangular	
						w/ .03' wide cracks filled w/ ~~silt~~ clay, probably	
						secondary. Nacholite crystals found	
						along cracks. Erosional contacts	
						Top and bottom	
1087.44-						Siltstone, 4/2 5YR, dk reddish brown	
1091.31						hard, non-calcareous laminated, w/<1%	
						pyrite, sandy in some areas and	
						occassional 0.02 laminae stringers	
						of bluish gray Sandstone, f grain	
						Both sandstone and Siltstone are	
						highly petroliferous	
						gradational lower contact	

NOTES:

FURRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-4 core
DATE 11-1-74 TITLE Sun Phillips
ELEVATION _____ DATUM MSL
START _____ COMPLETE _____
WATER LEVEL Dry AFTER _____
EQUIPMENT USED Layne Western, Gardner Denver 2000
LOGGED BY NOVAK

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1091.31-						Interluminated silty sandstone. 4/2	
1092.4						5YR dark ~~brown~~ reddish brown, f. grain, poorly	
						sorted subangular non calcareos and	
						sandy siltstone 6/3 5YR lt. reddish	
						brown. Depositional contact	
1092.08						Sandstone, bluish gray, f grain 0.04'	
						thick	
1092.4-						Marlstone 7/2 2.5Y, light gray	
1093.94						mod ~~[illegible]~~ hard, extremely effervesent	
						when powdered and increasing	
						Sandstone laminae, lensens and blebs	last 0.5'
						Toward bottom	
1093.85						0.09' thick bed of marlstone but	
						8/4 2.5Y, very pale brown	
						erosional contacts top and bottom	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-4 core
DATE 11-1-74 TITLE Sun Phillips
ELEVATION
DATUM MSL
START
COMPLETE
WATER LEVEL Dry AFTER
EQUIPMENT USED Layne Western, Gardner Denver 2000
LOGGED BY NovAK

Page 123

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1093.85-						Siltstone dark reddish brown, hard,	
1094.72						non calcareous, petroliferous, laminated	
						w/ 1% pyrite depositional contact	
1094.61						Sandstone black, vf grain, subangular	
						poorly sorted, v. highly petroliferous	
						0.07' thick	
1094.72						Marlstone - Sandy Marlstone, 7/2	
1096.60						2.5Y light gray, mod hard, highly	
						calcareous when powdered w/ lt gray	
						sandstone blebs and beds. 0.03' thick	
						f grain etc	End of
						effervesence decreases downward	Core Run
						hardness increases downward	1096.60

NOTES:

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P4 core

DATE 12/1/74 TITLE Sun/Phillips/Sohio

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED Layne Western
Gardner-Denver

LOGGED BY B. Sims

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1096.60 – 1116.62						Recovery 20.15/20.02	note: 13
						RQD = 100%	extra ft. of core;
1096.47 – 1097.15						Marlstone – same as above;	put at top of run –
						between 5Y 7/2 ē 6/2 light grey	labels
						and light olive grey; carbonate	begin at
						cement; hard; very effervescent	1096.47
						when powdered; v. thinly laminated to	
						to v. thinly bedded; magnetite	
						distributed throughout and in	
						rare deformed laminae – v.f.	
						sand size, v. minor bitumen	
						laminae – discontinuous;	
1097.15 – 1098						Siltstone – sandy ē highly	
						variable; upper 3' is gradational	
						change from above to siltstone	
						below; 1097.45 – siltstone ~	
						between 7.5YR 4/1 ē 4/2 – dark	
						grey ē brown; hydrocarbon,	
						clay cement, sulfides likely	
						do some cementing; v. hard;	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068 BORING NO. P4 core

DATE 11/1/74 TITLE Sun/phillips/Sohio ELEVATION ______ DATUM ______

START ______ COMPLETE ______ WATER LEVEL ______ AFTER ______

EQUIPMENT USED Layne Western - Gardner Denver LOGGED BY B. Siems

P. 125

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						non calcareous; v. thinly	
						laminated to thinly laminated;	
						magnetite; sulfide flecks -	
						gold; disoriented - pyrite or	
						marcasite; .65 - .85 marly	
						sandstone - light as above;	
						discontinuous wavy lenses of	
						magnetitic sand;	
1098.-1103.35						siltstone shaly; bet. 7.5 YR 4/1	
						& 4/2 - dark grey & brown; hydrocarbon	
						and clay cement, v. minor carbonate;	
						v. hard; v. slight effervescence	
						even powdered; v. thinly laminated -	
						laminae less distinct - color	
						variation in gen. is minor;	
						marcasite (?) needles & flecks	
						~1% or less; magnetite sand	
						infrequent laminae; two light	
						claystone beds - 1100.16 (.02')	
						& 1102.1 - .15;	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P4 core
DATE 11/1/74 TITLE Son/Phillips/sohio
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED Layne Western - Gardner Denver
LOGGED BY B. Siems

P. 126

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1103.35 – 1103.55						Sandstone - Tuffaceous, dark	
						grey, well sorted, subrounded,	
						f. grained, relatively even colored;	
						med. hard to hard; noncalcareous;	
						~ "massive," mica, quartz,	
						marlstone breccia (v. minor &	
						< .01'); sl. magnetitic;	
						Parting plane - 1103.55	
1103.55 – 1105.3						Marlstone - 2.5 Y 7/2 light	
						grey. (brownish yellow caste);	
						carbonate cement; mod. hard -	
						hard; v. effervescent powdered -	
						dolomite; very thinly laminated,	
						v. thinly bedded; becomes increasingly	
						sandy downward; magnetite	
						sand; increasingly hard,	
						1104.48 - .1' of deformed discontin-	
						uous laminae - erosional contact	
						below.	
105.3 – 1109.42						Shale 10YR 4/1 dark grey;	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P4 cont)

DATE 11/1/74 TITLE Sun/Phillips/Sohio

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED Layne Western - Gardner Denver

LOGGED BY B. Siems

p 127

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						hydrocarbon & clay cement; v.	
						hard; noncalcareous to sl.	
						calcareous when powdered; v. thinly	
						laminated; undeformed; marcasite	
						flecks;	
						marlstone beds 1108.15-.2, .59-.68	
						very pale brown; irregular contact	
						hummocky - v. small mounds -	
						sim. to algal str. much of	
						lower is v. fine. magnetite	
						sand,	
						marcasite flecks below 1108.68	
						v. fine magnetite sand present	
						as v. thin laminae, elsewhere.	
						Parting Planes - 1106.68, 1109.42	
1109.42 - 1110.3						Marlstone - 2.5Y 8/4 pale	
						yellow; carbonate cement; mod.	
						hard to hard; strong effervescence	
						powdered. has irregular bedding	
						as algal strom, thinly laminated -	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068 BORING NO. P4-Core
DATE 11/1/74 TITLE Sun/Phillips Sohio ELEVATION DATUM
START COMPLETE WATER LEVEL AFTER
EQUIPMENT USED Layne Western–Gardner Denver LOGGED BY B. Siems

p 128

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						thinly bedded; toward base picks	
						up laminae of v.f. magnetite	
						sand; toward top - laminae	
						of red brown shaly siltstone –	
						.61'; bottom - small worm	
						burrows(?) with magnetite	
						sand concentrated in fillings;	
1110.3 – 1110.65						Siltstone-marlstone – contact	
						interbedded c̄ deformed; siltstone	
						laminae are broken but rarely	
						displaced; burrows occur and	
						cut beds; magnetite occurs	
						as silt c̄ very fine sand;	
1110.65 – 1111.8						Siltstone – shaly 10 YR 3/2 v	
						dk. grayish brown; v.f. gr.;	
						thinly laminated; carbonate	
						c̄ hydrocarbon cement; hard;	
						mod. effervescence when powdered;	
						laminae undeformed; marcasite?	
						flecks & tiny magnetite sand layers.	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 11/1/74 TITLE Sun Phillips/Sohio
START______ COMPLETE______
EQUIPMENT USED Layne Western - Gardner Denver

BORING NO. P4 core
ELEVATION______ DATUM______
WATER LEVEL______ AFTER______
LOGGED BY B Siems

P. 129

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						1110.97 – 1111.09 - brecciated	
						claystone(?) with magnetite matrix.	
						Parting planes – 1111.09	
1111.8 – 1112.8						Marlstone as before (1109.42)	
						contains .63' thick bed of	
						bituminous shale.;	
						Partings – 1112.01	
1112.8 – 1114.53						Oil shale 7.5 YR 3/2 drk.	
						brown to blk.; v. thinly laminated;	
						hydrocarbon cement; carbonate;	
						v. hard; slightly calcareous	
						scratched; v. thinly laminated –	
						laminae undulate & pinch; upper	
						section grades into marlstone above;	
						med. to highly petroliferous.	
1114.53 – 1115.6						Sandstone - marly; 2.5 Y 7/1 with	
						6/2 marl beds & breccia pieces;	
						v.f. grained; carbonate cement;	
						hard; v. finely laminated to v. thinly	
						bedded; laminae in marly portions	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P4 Core
DATE 11/1/74 TITLE Sun/Phillips/Sohio
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED Layne Western Gardner Denver
LOGGED BY B Sieng
P 130

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						are cut by magnetite sand filled	
						worm(?) burrows; some marl	
						beds have been broken & deposited	
						as breccia; others are broken	
						by fractures - magnetite sand filled;	
						some beds are distorted; one	
						irregular magnetite healed fracture	
						extends from ≃ 1114.53–1115.6	
						Partings – 1114.65	
1115.6–1116.61						Shaly siltstone – red brown, v. hard;	
						carbonate & hydrocarbon cement;	
						flecks & crystal concentrations	
						of pyrite(?) or marcasite;	
						petroliferous odor – slight to	
						mod. petroliferous; gradational	
						contact w/marly sandstone above.	
1116.62–1136.62						Recovery = 19.59/20	
						RQD = 16.6/19.6	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 11/1/84 TITLE Sun/Phillips/solios
START ______ COMPLETE ______
EQUIPMENT USED Layne-Western-Gardner Denver

BORING NO. P4 core
ELEVATION ______ DATUM ______
WATER LEVEL ______ AFTER ______
LOGGED BY B. Siems
P 131

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						Partings are concentrated in marlstone.	
						Core labeled 1116.62-1136.32 -	
						part of missing distributed within,	
						most left at end;	
						Core is basically a series of marlstone	
						beds separated by oil shales-	
						ea bed 1-2' thick;	
1116.6—1118.45						Siltstone shaly 7.5 YR 3/2	
						dark brown; carbonate & hydrocarbon	
						cement; hard-v. hard; sl. to	
						mod. effervescent; v. thinly	
						laminated-undeformed; marcasite(?)	
						blebs—coarse sand size; random	
						orientation; some concentrated	
						with magnetite in snakelike fracture;	
						Partings — 1118.45	
1118.45—1121.85						Marlstone sandy clayey; upper	
						contract abrupt; lower gradational;	
						5Y 7/2 (light grey) 5 Y 6/1 grey;	
						carbonate cement, mod. hard;	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 11/7/74 TITLE Sun/Phillips/Sohio
START ____ COMPLETE ____
EQUIPMENT USED Layne Western - Gardner Denver

BORING NO. P4 Core
ELEVATION ____ DATUM ____
WATER LEVEL ____ AFTER ____
LOGGED BY B Siems

p. 131a

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						v. effervescent; calcite ē dolomite;	
						thinly laminated to v. thinly bedded;	
						beds broken frequently by burrows	
						or fracturing; some beds slightly	
						tilted or offset; burrows usually	
						filled by coarser material than	
						~~by~~ they were formed in; magnetite	
						sand & silt dispersed throughout	
						and concentrated in coarser beds;	
						bed yellower near top - grades into	
						grayer beds - bottom 5Y 5/1	
						Parting Planes - 118.5, 1118.7,	
						1119.46, 1119.72, 1120.92	
1121.85 - 1122.95						Oil Schale - 7.5 YR 3/2; v.	
						dark grey to dark brown; carbonate	
						ē hydrocarbon cement; v. hard; slight	
						to mod. effervescence; v. thinly	
						laminated - undeformed - except where	
						cut by burrows & burrows filled by non-or	
						less petroliferous mudstone; slight -	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068

DATE 11/1/74 TITLE Sun/Phillips/Sohio

START ______ COMPLETE ______

EQUIPMENT USED Layne Western - Gardner Denver

BORING NO. P4 core

ELEVATION ______ DATUM ______

WATER LEVEL ______ AFTER ______

LOGGED BY B Sims

P. 131 B.

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						mod. petroliferous; minor flecks	
						of marcasite(?) or pyrite(?) Lower	
						contact abrupt;	
						Partings – 1122.12, 1122.45	
1122.95 – 1127.6						Marlstone similar to above	
						(1118.45); rare include shale	
						& v.f. siltstone laminae;	
						beds not deformed by burrows;	
						gen. flat – rare lenses;	
						frequent primary offsets	
						(compaction) cut beds – offsets to	
						.03'; at about 1127.4 becomes	
						browner & begins grading into	
						underlying petroliferous zones	
						Partings – 1123.13, 1123.75, 1123.89,	
						1124.25, 1124.55, 1125.3, 1125.78,	
						1125.97, 1126.35, 1126.44, 1126.7	
						1127.26	
1127.6 – 1128.5				1'	Oil, 1' shale	Siltstone – shaly, similar to 1121.85 –	
						laminae undeformed ~ 1127.8 – .9 –	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P4 (core)

DATE 11/1/74 TITLE Sun/Phillips/Sohio

ELEVATION ______ DATUM ______

START ______ COMPLETE ______

WATER LEVEL ______ AFTER ______

EQUIPMENT USED Layne Western - Cardwell) Denver)

LOGGED BY B. Siems

p. 131 C

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
						sandstone - irregular contacts; discontinuous	
						bed, petroliferous too. mod. to	
						highly petroliferous, 1128.5 begins	
						grading into marlstone	
						Partings - 1127.95, 1128.09	
1128.85 - 1130.7						Marlstone clayey; 7.5 YR 7/2;	
						similar to 1118.45; sand v. minor;	
						more clayey; burrows cut & deformed	
						beds; some lensing; minor beds	
						eroded & breaciated; matrix	
						silty - v.f. sand;	
						Partings - 1129.07, 1129.28, 1129.8,	
						1130.05	
1130.7 - - 1133.6						Oil Shale similar to 1121.85';	
						upper half cut by burrows (?) to	
						2' deep; lower half - undeformed	
						laminae);	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-066
BORING NO. P4
DATE 4/1 TITLE Sun Phillips/SOHIO
ELEVATION ______ DATUM ______
START ______ COMPLETE ______
WATER LEVEL ______ AFTER ______
EQUIPMENT USED Gardner Denver
LOGGED BY B. Sean

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DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
1133.6-1135.6						Marlstone - as 1128.85; minor offsets;	
						some slump structures; more than	
						50% undeformed;	
1135.6 - 1136.32						Oil shale as 1130.7; undeformed; contact	
						shale gradational	End of
							run 1136.62
					→	1136.32 - 1136.62 No Recovery	
						However, recovered 0.2' on next run	
1136.42-						~~Siltstone (oil shale)~~	
~~1143.41~~						Parting planes horizontal 1142.82	
1156.62						1146.61, 1148.84, 1151.70, 1151.86	
						1152.98	
1136.42-						Siltstone (oil shale) 3/2 5YR, dk reddish	
1143.41						brown, hard, non calcareous, thinly	
						laminated, highly petroliferous w/	
						0.5 - 1% pyrite. Fairly homogeneous	
						depositional bottom contact	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-4 core

DATE 11/2/74 TITLE Sun Phillips

ELEVATION ______ DATUM MSL

START ______ COMPLETE ______

WATER LEVEL Dry AFTER ______

EQUIPMENT USED Layne Western, Gardner Denver 2000

LOGGED BY Novak

Page 133

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1136.42-						Siltstone (oil shale) cont.	
1143.41 cont							
1136.42						Sandstone, black, f. grain bleeding	
						oil, detail obscured 0.03' thick	
						depositional contacts Top and bottom	
1137.23						Siltstone, 6/3 5YR lt reddish brown	
						0.11' thick, hard, non calcareous, massive	
						nonpetroliferous, erosional upper contact	
						gradational lower contact	
1141.1						Bleeding oil slightly from 0.03 x .07'	
						bleb. No distinguishable lithologic	
						change from Siltstone (oil shale)	
1142.5						Bleeding oil as above	

NOTES:

FIELD LOG OF BORING

PROJECT NO. 74-068
DATE 11-2-74 TITLE Sun Phillips
START ____ COMPLETE ____
EQUIPMENT USED Layne Western, Gardner Denver 2000

BORING NO. P-4 core
ELEVATION ____ DATUM MSL
WATER LEVEL Dry AFTER ____
LOGGED BY Novak

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DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1143.1-						Marly Siltstone, 6/3 5YR lt. reddish	
1145.01						brown, hard, slightly-mod calcareous whe.	
						powered, Thinly laminated w/ slight	
						banding due to siltstone (oilshale) laminae	
						Gradational lower contact	
1145.01-						Siltstone (oilshale) as described at	
1146.54						1136.42. lower contact gradational	
1146.54-						Siltstone (oil shale) 3/2 5YR dk reddish	
1156.62						brown and 5/1 5GB bluish green, hard	
						non calcareous, thinly laminated, slightly	
						mod petroliferous w/ 1% pyrite, rare	
						pieces of carbonized mat'l. At 1148.5,	
						remaining core is bluish green	
1149.93						Siltstone, 6/2 5YR pinkish brown	
						hard, non-calcares, faintly laminated	
						faintly laminated, gradional contacts	
						top and bottom	

NOTES:

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-4 core
DATE 11-2-74 TITLE Sun Phillips
ELEVATION ______ DATUM MSL
START ______ COMPLETE ______
WATER LEVEL Dry AFTER ______
EQUIPMENT USED Layne Western, Gardner Denver
LOGGED BY Novak

Page 135

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1146.54-						Siltstone oil shale 5/1 5GB bluish	
1156.6 cont.						green (CONT.)	
1150.35						Pod of Pinkish brown Siltstone as	
						described at 1149.93 0.2 x 0.3'	
1151.27						Bed of Pinkish brown Siltstone as	
						above 0.03' Thick	End of
							core run
1153.5						As above 0.1' Thick	1156.6
1156.62-						Parting planes horizontal 1157.7	
1173.00						1159.43, 1160.47, 1161.04, 1166.74	
						1167.39, 1170.28, 1172.91	
						30° Fracture 1157.56	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-4 core
DATE 11/2/74 TITLE Sun Phillips
ELEVATION ______ DATUM MSL
START ______ COMPLETE ______
WATER LEVEL Dry AFTER ______
EQUIPMENT USED Layne Western Gardner Denver 2000
LOGGED BY NOVAK

Page 136

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1156.62						Siltstone (oilshale) as described at	
1163.54						1146.54, 5/1 5GB, bluish green,	
						hard, non calcareous, thinly laminated,	
						mod petroliferous w/ 1-3% pyrite	
						increasing downward, 1% magnetite	
						decreasing downward. depositional	
						lower contact	
1163.54-						Marly silty Sandstone 4/4 5YR	
1164.51						reddish brown and 5/2 2.5Y grayish	
						brown, vfine grain, poorly sorted, subangular	
						mod-highly eff. when powdered, thinly	
						laminated w/ grayish brown occassionally	
						infilling cracks in reddish brown, relatively	
						no accessory minerals. gradational bottom	
						contact	
1163.68						Sandy marlstone gray to black 0.1 thick	
						w/ several worm burrows 0.03 x 0.12'	
						infilled by above SS, depositional upper contact	

erosional lower contact

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-4 core

DATE 11/2/74 TITLE Sun Phillips

ELEVATION ______ DATUM MSL

START ______ COMPLETE ______

WATER LEVEL Dry AFTER ______

EQUIPMENT USED Layne Western, Gardner Denver 2000

LOGGED BY NOVAK

Page 137

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1164.51 - 1167.12						Siltstone (oil shale) 3/2 5YR, dk reddish brown-black, hard, non calcureous, mod-highly petroliferous, Top 0.73' lenses, Truncated laminations with blebs of marly sandstone v. disrupted. Remaining portion is thinly laminated w/ occassional stringer of marly sandstone as above, < 1% pyrite. Depositional bottom contact	
1167.12 - 1168.17						Marlstone, 7/2 5YR, pinkish gray, mod hard - hard, thinly laminated, v. highly eff. when powdered w/ occassional marly sandstone filled fractures, f. grain gradational bottom contact	
1168.17 - 1169.98						Siltstone (oil shale) 3/2 5YR, dk reddish brown, hard, non calcareous thinly laminated w/ < 1% pyrite, mod-highly petroliferous depositional bottom contact	

NOTES:

FUGRO

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-4 core
DATE 11/2/74 TITLE Sun Phillips
ELEVATION ______ DATUM MSL
START ______ COMPLETE ______
WATER LEVEL Dry AFTER ______
EQUIPMENT USED Layne Western Gardner Denver 2000
LOGGED BY Novak

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DEPTH	SAMPLES					DESCRIPTION Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	REMARKS
		No.	Type	Blows or Force	Recovery, Condition		
1169.07						Sandstone, black, v.f. grain, poorly sorted subangular, highly petroliferous. It's a lense 0.03' thick max. Depositional contacts top and bottom	
1169.54						Linear string of marchisite blebs 0.02 x 0.03'	
1169.98 - 1170.70						Marlstone, 6/1 5YR, gray, hard & highly eff when powdered, thinly laminated w/ thin marly claystone parting planes	
1169.98						Sandstone 4/3 5YR reddish brown 0.02' thick, f grain, poorly sorted, subangular clay cemented, thinly laminated, depositional contacts	

NOTES:

FUGRO

7-23-73 L-013

FIELD LOG OF BORING

PROJECT NO. 74-068
BORING NO. P-4 core
DATE 11/2/74 TITLE Sun Phillips
ELEVATION ______ DATUM MSL
START ______ COMPLETE ______
WATER LEVEL Dry AFTER ______
EQUIPMENT USED Layne western Gardner Denver 2000
LOGGED BY Novak
Page 139 of 139

DEPTH	SAMPLES					DESCRIPTION	REMARKS
		No.	Type	Blows or Force	Recovery, Condition	Soil type, color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
1170.7						Marly Claystone, 5/2 2.5Y grayish	
1173.0						brown, hard, v highly eff when powdered	
						thinly laminated and extremely solutionized	
						w/ many erosional remnants, cavities	
						up to 0.2 x 0.4' and worm burrows	
						0.05 x 0.2'. Solution cavities and fractures + burrows	
						filled w/ Marly Claystone 5/2 5G,	
						green, hard, v highly effervescent when	
						powdered	
1173.0						TD	

NOTES:

FUGRO

VI. HISTORIC AND SCIENTIFIC INVESTIGATIONS

Antiquities Section
Utah Division of State History

Reconnaissance and Analysis Procedures on Arbitrarily Defined Project Areas

Field Methods

The research design of an archeological field survey is dependent on the nature of the project of which it is a part. Projects which are strictly research oriented may vary from an intensive survey of a transect cross-cutting several ecozones to a random sampling of a particular drainage area. The survey area in projects of this type is dependent on rational evaluation of environmental and cultural factors. However, the survey area of many projects (particularly contract surveys) is based, not on these parameters, but on arbitrarily defined limits. Surveys of proposed highway routes or proposed mining areas are examples of this type of project. Cultural resource surveys of these projects consist of an intensive surface reconnaissance of all areas within the arbitrarily defined boundaries. Such a survey involves the following:

1- An intensive on the ground survey by a trained and experienced survey crew. Crew size is dependent on the nature and size of the project. Such a survey consists essentially of simply walking the area at closely spaced intervals to insure that all areas of the surface are observed. Spacing is dependent of terrain.

2- Contact is made with local residents to glean possible information about archeological sites in the area. This is done (a) to insure that no sites are missed, and (b) to identify sites that may have been destroyed beyond recognition by relic hunting.

3- If sites are located they are described and plotted on maps. Photographs and artifact samples are taken. The site is carefully searched for artifacts diagnostic of culture(s) represented.

Analysis

Since the purpose of archeological surveys of arbitrarily defined projects is to (a) make an inventory of cultural resources and (b) provide recommendations concerning the deposition of those resources, analysis and research procedures are relatively simple.

1- Artifacts are washed, labled, cataloged, and identified. Particular attention is given to diagnostic artifacts since these help determine the nature of the site from which they were recovered.

2- Artifacts are simply measured, described and listed along with a description of the site and an interpretation of recovered data. Complex analysis procedures such as the determination of wear patterns on stone tools or the nalysis of ceramic technology are not attempted.

3- A search of archeological literature dealing with the area is done to provide a background of known sites in the area.

4- Field data describing the site and its environmental locus are combined with the artifactual data and interpreted in light of known archeological information from the study area. Interpretations of the nature of the sites and recommendations concerning thier deposition are then made.

1896

STATE OF UTAH
Calvin L. Rampton, Governor
DEPARTMENT OF
DEVELOPMENT SERVICES
Division of State History
Melvin T. Smith, Director
603 East South Temple
Salt Lake City, Utah 84102
Telephone: (801) 328-5755

December 19, 1974

Mr. Andrew Jackson
VTN Colorado Inc.
2600 South Parker Road
Denver, Colorado 80232

Re: Cultural Resources reconnaissance of Moon Lake Electric Association Incorporated Power line Routes Serving the Utah Oil Shale Lease Area

Dear Andy,

A survey of the proposed power line routes was conducted from November 25 to December 4, 1974. A report of the survey is enclosed.

A single site (42Un401) is located in the northwest ¼, of the southeast ¼, of Section 2, T10S, R25E. The site has both historic and prehistoric components and should be avoided during powerline construction. With the exception of this section of powerline, the project area is clear of cultural resources.

Sincerely,

David B. Madsen

DAVID B. MADSEN
State Archeologist

DBM:lg

Encl.

STATE HISTORY BOARD: Dr. Milton C. Abrams, Chairman • Theron H. Luke • Juanita Brooks • Cleo L. Jensen • Howard C. Price, Jr.
Dr. Dello G. Dayton • Dr. Richard O. Ulibarri • Helen Z. Papanikolas • Clyde L. Miller • Elizabeth Skanchy • Naomi Woolley

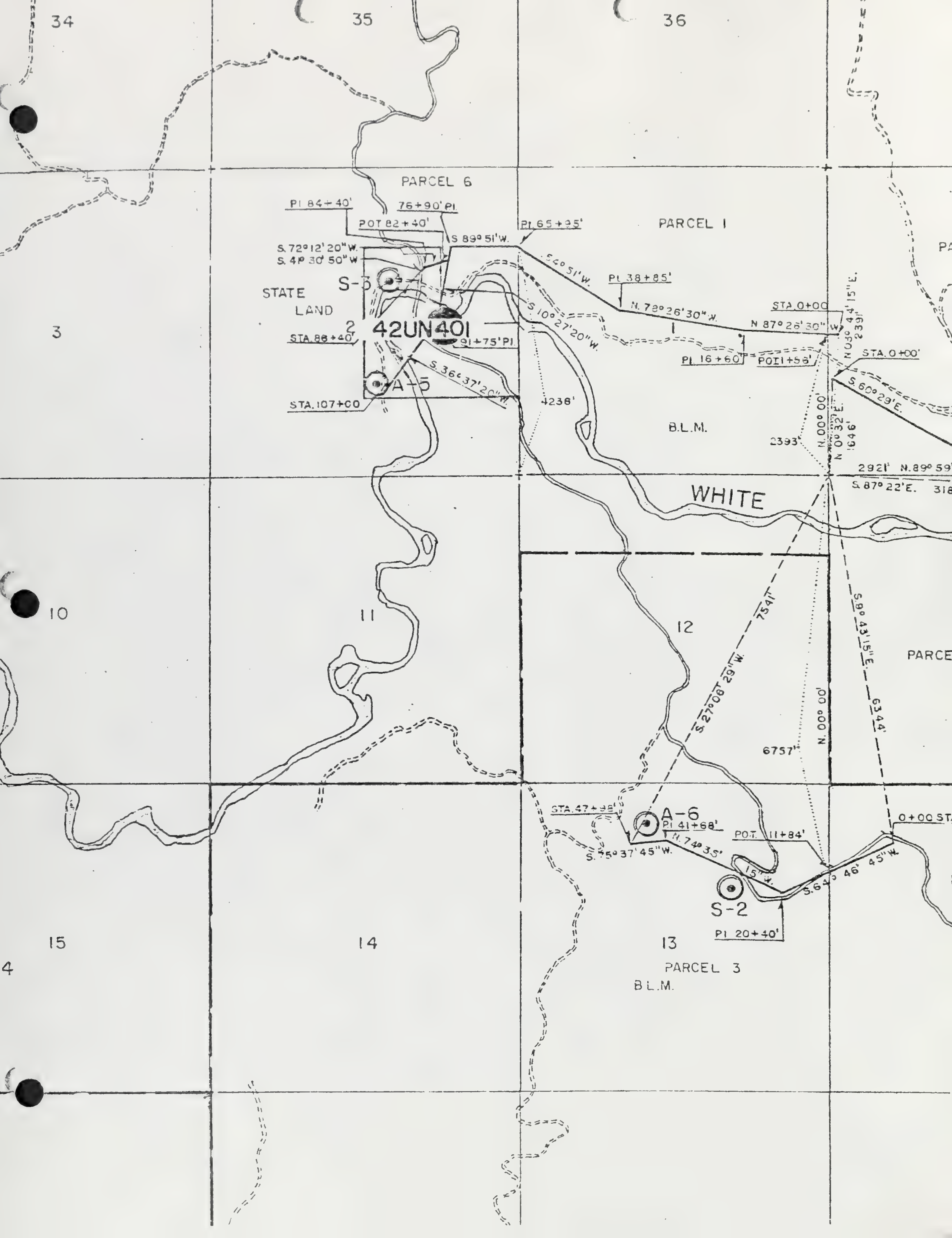
ARCHEOLOGICAL SURVEY

Area Covered:	Moon Lake power line and access roads serving the Utah oil shale lease in Uintah County, Utah
Survey Crew:	Stanley D. Davis, John T. Autrey Utah State Historical Society

The survey was conducted from November 25, 1974 through December 4, 1974. Approximately 60 hours of field work were utilized to cover the proposed accesses.

The power line right-of-way, with one exception, was devoid of any archeological material. This one site is concurrent with the Ignatio Stage stop on the south bliff of the White River. (NW section of the SE section of Section 2, Township 10 south, Range 24 east.) The site extends 100 meters south and 100 meters east of the road cut and the south edge of the bluff. The three existing buildings of the Ignatio Stage stop overlie portions of the site. The archeological material that has been located is pre-historic in nature, however, no cultural affinity has been determined at this time.

Stanley D. Davis


34
35
36
PARCEL 6
PI 84+40'
76+90' PI.
POT 82+40'
S 89° 51' W.
PI 65+95'
PARCEL 1
PA
S. 72° 12' 20" W.
S. 41° 30' 50" W
S-5
STATE
LAND
3
2
42UN401
STA. 88+40'
91+75' PI.
S. 36° 37' 20" W.
A-5
STA. 107+00
S. 40° 51' W.
PI 38+85'
S. 10° 27' 20" W.
N. 73° 26' 30" W.
STA. 0+00
N 87° 26' 30" W
N 03° 44' 15" E.
2391'
1
PI 16+60'
POT 11+56'
STA. 0+00'
S. 60° 29' E.
4238'
B.L.M.
2393'
N. 00° 00'
N 0° 32' E.
1646'
2921' N. 89° 59'
S. 87° 22' E. 318
WHITE
10
11
12
7541'
S. 27° 08' 29" W.
S. 0° 43' 15" E.
6344'
N. 00° 00'
6757'
PARCE
STA. 47+88'
A-6
PI 41+68'
N. 74° 35' 15" W.
S. 75° 37' 45" W.
POT. 11+84'
0+00 STA
S. 64° 46' 45" W.
S-2
PI 20+40'
15
14
13
4
PARCEL 3
B.L.M.

Antiquity Section

SITE SURVEY SHEET

Archeological Survey

Division of State History

Site No. 42Un401 County Uintah State Utah

1. Map Reference Southam Canyon Quad, USGS

2. Type of Site Open; campsite and historic structure

3. Cultural Affiliation (if known) historic Anglo; probable Fremont

4. Location On bluff on south side of White River. Ca. 50 meters east of Utah Highway 45.

NE¼, SE¼ Sec. 2 T. 10S R. 24E

5. Owner and Address State of Utah

6. Previous Owners --

7. Tenant none

8. Informants none

9. Previous Designations for Site none

10. Site description, position, & surrounding terrain Remaining buildings of the Ignatio stage stop overlay the western portion of the archeological site. To the south the terrain rises gradually and is cut by numerous arroyos. High cliffs are found on the north side of the river. Vegetation is sparse, consisting of scattered grass, sagebrush, eriogonum and cactus. Site consists of scattered lithic debris, pottery and ground stone on surface. There is a possible 4x7 meter structure of slabs & irrigular rock.

11. Area of Occupation 100 x 100 meters

12. Depth and Character of Fill trash heaps associated with the stage stop are ca. 1 meter deep. Depth of archeological site is unknown.

13. Present Condition some potting, but basically undisturbed

14. Material Collected lithic debris, corrugated gray pottery and ground stone

15. Material Observed same as #14 above, plus historic artifacts

16. Material Reported and Owner --

17. Recommendations for Further Work testing of archeological site

18. Photo Nos. SDD 30 through 36

19. Type of map made by survey party --

Recorded by Stanley D. Davis Date December 1, 1974

December 31, 1974

To: Andy Jackson
VTN Colorado, Inc.
2600 South Parker Road
Denver, Colorado 80232

From: David B. Madsen
State Archeologist
603 E. South Temple
Salt Lake City, Utah 84102

Re: Archeological Survey of Oil Shale Lease Areas U-A and U-B

Introduction

The following is a brief outline of a cultural resources inventory on the oil shale lease areas conducted between November 1, and December 31, 1974. This is an intentionally brief interim report of continuing work.

Scheduling

Fieldwork was re-initiated November 25, 1974 and ran continuously (including weekends) until December 23, 1974. A reconnaissance of the proposed Moon Lake Electric Association powerline was completed during this period in addition to continued survey of the lease area.

Laboratory analysis and research has been initiated and a total of 360 man-hours have been spent on the project to date. This includes washing, labeling, artifact analysis, inventory of previously identified sites, literature search, etc.

Inventory

Sections 18 and 31, T10S, R24E, have been surveyed. In addition, areas outside the survey boundaries were investigated since we felt that these areas potentially contained sites which might be affected by oil shale operations. These areas include Sections 6 and 7, T11S, R25E, along Evacuation Creek and Section 9, T10S, R24E along the White River. The proposed powerlines and access roads were also surveyed during this period.

Personnel

Stanley D. Davis and John T. Autrey were involved in fieldwork. Laboratory analysis and research has been conducted by Michael Berry, Christian Lund, and Thomas Zeidler under my direction.

Sites:

An additional 4 sites have been located and recorded (Appendix A). These consist of a rockshelter (42Un404), a pictograph of a possible big-horn sheep (42Un403), and two open campsites (42Un401 and 402). The deposits at the rockshelter are at least four feet deep, but they are being eroded away by stream action. For these reasons testing is highly recommended.

The open site, 42Un401, is partially covered by the historic Ignacio Stage Stop and must be considered a multi-component site. It is important because it contains the only ceramics recovered to date in our survey operations. These potsherds are the only diagnostic artifacts recovered from the site and are identified as Tusayan Corrugated. This ceramic type would normally indicate an Anasazi culture occupation. However, there are no known Anasazi sites this far north and all Anasazi pottery found to date in the Uintah Basin is associated with Fremont culture sites and represents tradeware. For this reason 42Un401 has been provisionally designated as a probable Fremont site. It is critically important that this site be tested since the presence of an aberrant pottery type suggests the possibility that the site may shed new light on the prehistory of the Uintah Basin.

Antiquity Section SITE SURVEY SHEET *Division of State History*

Archeological Survey

Site No. 42Un402 County Uintah State Utah

1. Map Reference Southam Canyon Quad, USGS
2. Type of Site Rock Shelter
3. Cultural Affiliation (if known) --
4. Location On north side of White River on a high bluff, sitting between two higher protions (in saddle) of the bluff.

S SE¼, SE¼ Sec. 16 T. 10S R. 24E

5. Owner and Address BLM
6. Previous Owners --
7. Tenant none
8. Informants none
9. Previous Designations for Site unknown
10. Site description, position, & surrounding terrain A bluff with shelter on north side of river between 2 high portions of the bluff (in saddle). Faces So. toward river. Terrain drops gently to upper (older) terrace of river. Shelter runs east, west along face of bluff. Shelter is 10 to 15 meters deep. Vegetation is greasewood, rabit brush, cactus.
11. Area of Occupation 75 meters (E-W) and 75 meters (N-S) toward river
12. Depth and Character of Fill wind blown material & animal dung. Some erosion on front portion of site.
13. Present Condition Good, some digging has taken place (about 6" deep and 4' long on eastern portion of site).
14. Material Collected falkes, scrapers, bifaces, choppers (large & small), hammer stone mano frag.
15. Material Observed same as #14 above and chipping debris
16. Material Reported and Owner none
17. Recommendations for Further Work test
18. Photo Nos. White River SDD 1,2,3,4
19. Type of map made by survey party --

Recorded by Stanley D. Davis Date December 14, 1974

Antiquity Section SITE SURVEY SHEET *Division of State History*

Archeological Survey

Site No. 42Un403 County Uintah State Utah

1. Map Reference Rainbow Quad, USGS

2. Type of Site Pictograph

3. Cultural Affiliation (if known) --

4. Location Ten ft. off north side of road cut on sandstone cliff facing south.
Ten ft. below crest of small cliff.
SE¼, SE¼ Sec. 23 T. 11S R. 24E

5. Owner and Address BLM

6. Previous Owners --

7. Tenant none

8. Informants none

9. Previous Designations for Site unknown

10. Site description, position, & surrounding terrain Possible bighorn sheep--8½" long by 6" high pictograph on sandstone cliff 10 ft. below top and 10 ft. north of road cut. Vegetation: juniper, greasewood, grasses, sage, pinyon pine. Terrain is disected by many canyons and is generally undulating in nature. No cultural material found.

11. Area of Occupation pictograph on side of cliff

12. Depth and Character of Fill not applicable

13. Present Condition Good, recent illegible signatures scratched into cliff face (historic), approx 2 ft. east of pictograph

14. Material Collected none, not applicable

15. Material Observed pictograph

16. Material Reported and Owner not applicable

17. Recommendations for Further Work none

18. Photo Nos. #5, SDD, White River

19. Type of map made by survey party --

Recorded by John T. Autrey Date December 20, 1974

Antiquity Section Division of State History

Archeological Survey

Site No. 42Un404 County Uintah State Utah

1. Map Reference Southam Canyon Quad, USGS

2. Type of Site Rock Shelter

3. Cultural Affiliation (if known) --

4. Location South of dirt road just north of White River. Shelter faces west on north bank of River.

NW¼, SW¼ Sec. 16 T. 10S R. 24E

5. Owner and Address --

6. Previous Owners --

7. Tenant --

8. Informants none

9. Previous Designations for Site none

10. Site description, position, & surrounding terrain Sandstone bluff 15 yards above north edge of White River. Rock Shelter faces west. Drainage wash runs directly below bluff. The front or west portion of the deposit has been washed away. Accumulation of material is greater than 4 ft. Possible projectil e point was found on surface on the inner protion of the rock shelter on the south end.

11. Area of Occupation 30 meters long by 15 meters deep

12. Depth and Character of Fill Greater than 4 ft., composed of wind blown sand, gravel, sheep dung

13. Present Condition front portion of fill eroded into drainage wash

14. Material Collected possible projectile point or knife (large)

15. Material Observed same as #14 above

16. Material Reported and Owner none

17. Recommendations for Further Work test

18. Photo Nos. SDD, White River #6,7,8

19. Type of map made by survey party --

Recorded by John T. Autrey Date December 20, 1974

1896

STATE OF UTAH
Calvin L. Rampton, Governor
DEPARTMENT OF
DEVELOPMENT SERVICES
Division of State History
Melvin T. Smith, Director
603 East South Temple
Salt Lake City, Utah 84102
Telephone: (801) 328-5755

April 1, 1975

Mr. Andy Jackson
VTN Colorado, Inc.
2600 South Parker Road
Denver, CO 80232

Dear Andy,

Enclosed is what is essentially a quarterly report. I have combined the monthly reports for you since essentially the same work has been going on.

Also enclosed is a statement of costs incurred since the last statement. If you need anything further, please let me know.

Sincerely,

Dave

DAVID B. MADSEN
State Archeologist

DBM:lg

Encl: 2

STATE HISTORY BOARD: Dr. Milton C. Abrams, Chairman • Theron H. Luke • Juanita Brooks • Cleo L. Jensen • Howard C. Price, Jr. Dr. Dello G. Dayton • Dr. Richard O. Ulibarri • Helen Z. Papanikolas • Clyde L. Miller • Elizabeth Skanchy • Naomi Woolley

QUARTERLY REPORT FOR VTN COLORADO, INC.

HISTORY

The State Historical Society has contracted with the American West Center at the University of Utah to perform a historical survey of the Uintah Basin with specific reference to oil shale lands. We had some difficulty in satisfying the Attorney General's office in the exact wording of the contract which necessitated a delay of several weeks. As a result they have asked for an extension of their report deadline to May 15, 1975. However, even at this late date we should be able to incorporate their final report into our preliminary draft.

ARCHEOLOGICAL LITERATURE SURVEY

For the last three months we have had a member of our staff working full time on the delineation of the prehistory of the Uintah Basin. This study includes a discussion of the history of archeological research, a general discussion of the prehistory of the Uintah Basin and its position in North American prehistory, and specifically deals with the oil shale lease areas. This is proving to be more time consuming than I had first anticipated since we are uncovering unsuspected ties with cultures of the Great Plains in the Uintah Basin area. This suggests that the archeological survey of the oil shale lands may be much more scientifically valuable than we had anticipated.

ARTIFACT ANALYSIS

We have initiated preliminary analysis of artifacts collected during our late fall survey. These preliminary studies indicate occupation of the area by Archaic peoples (10-2500 B.P.), Fremont peoples (1500-1,000 B.P.) and possibly Plains peoples.

OUR TENTATIVE SCHEDULE

Given cooperation by the weather, we should resume field work April 15 and complete it within one month. Final analysis and drafting of the preliminary report should be completed by June 1. Completion of the final draft will be dependent on suggested changes.

Although this schedule is is rather tight, we should have no problem meeting it since most of the background work has been completed

Brigham Young University

RECEIVED APR - 7 1975

Mr. Andy Jackson
VTN
2600 S. Parker Rd.
Parker Place #4
Denver, Colorado 80232

April 2, 1975

Dear Andy:

There is very little to report by way of progress for the paleontological survey of tracts U-a and U-b for the month of March. Most of the work done involved a literature search of past geological-paleontological studies. A field party did leave to continue the remaining part of the survey on March 31, but were forced to discontinue because of a storm that brought a foot of snow. If weather permits, the survey party will begin work in the field the beginning of next week. Approximately twelve sections remain to be completed.

Sincerely,

Wade

Dr. Wade E. Miller
Assoc. Prof. of Zoology & Geology

Department of Zoology, 575 WIDB, Brigham Young University, Provo, Utah 84602 (801) 374-1211, Ext. 2006